FLIGHT, JUNE 28, 1934

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FIRST AERO WEEKLY IN THE WORLD

JUL 9 1934

FLIGHT

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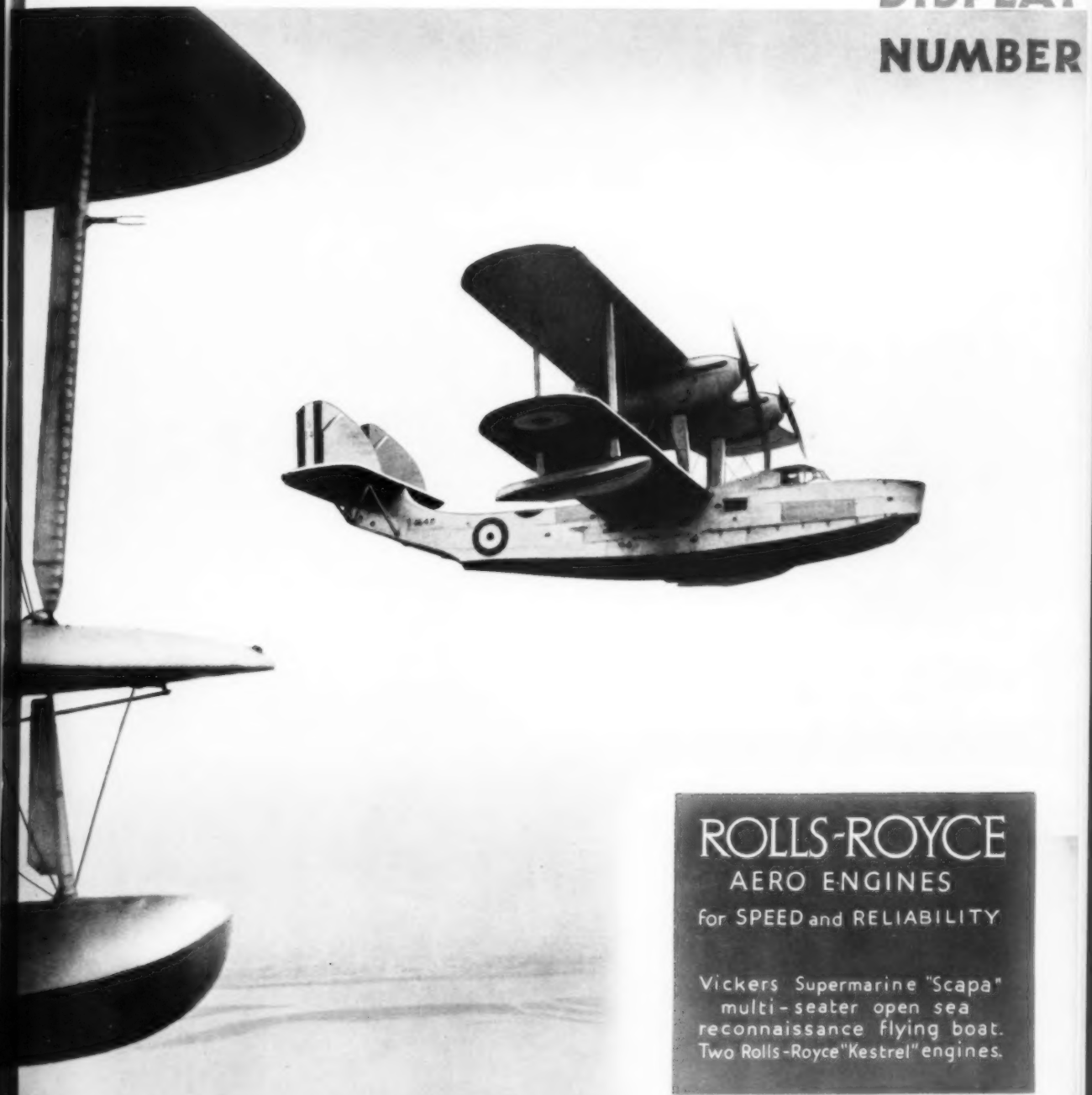
The AIRCRAFT ENGINEER AND AIRSHIPS

No. 1331
Vol. XXVI

OFFICIAL ORGAN
OF
THE ROYAL AERO CLUB

R.A.F. DISPLAY NUMBER



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FIRST AERONAUTICAL WEEKLY IN THE WORLD

DEVOTED TO THE INTERESTS, PRACTICE AND PROGRESS OF AVIATION

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

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Preparedness – and the R.A.F. Display

"DISARMAMENT by itself will not prevent war," said Mr. Baldwin in the House of Commons not long ago. It is a very true saying, for if men feel that there is nothing for it but to fight, they will fight with stick and stones until such time as factories can make them something more efficient. On the other hand, to be disarmed, or insufficiently armed, is to invite attack. The Bishop of Birmingham has just delivered an address in which he urged that Great Britain should disarm whether other countries did so or not, and for safety "trust to a policy of international righteousness of co-operation with other nations so dangerous as to seem quixotic." Such a policy would be much the same as attempting to eradicate crime by disbanding the police force and appealing to the better feelings of Bill Sykes. So long as there are in the world men or nations of ill-will, so long must there be force to restrain them. The pacifist in his armchair is too apt to forget the policeman outside in the street who creates for him an atmosphere of peace. He says to himself that he does not need a revolver to guard himself, and he does not want to shoot anybody, so why cannot the nations take up the same attitude? But if that policeman and his fellows were all removed, how long, we wonder, would the pacifist be content to remain without a revolver in his possession.

Bishop Barnes admitted frankly that his policy would be dangerous and might end in disaster. He may rest assured that the great mass of Britons will not be willing to run such a risk. We have already gone as far as could be dared along the path of disarmament, and the world has smiled at us and voted more money for its armaments. Mr. Baldwin, in the name of the Government, has given a pledge that we shall no longer pursue the same policy. Our Air Force must be brought up to a strength which will prevent it from being overwhelmed by one sudden onslaught. It is full time that steps were taken to put that pledge into practical operation, and we believe that the Government is already active in the matter.

On Saturday many thousands of people will gather at Hendon to see the R.A.F. Display. They will be able to assure themselves that in quality the R.A.F. is of the best. It is only in numbers that it is lacking. Lord Trenchard said recently that a good squadron could cut its way through a lot of inferior material, like a knife through butter, provided that it was not too heavily outnumbered. We believe our Air Force could do a great deal of that cutting, if the need arose, but it is for the Government and the people to see that it is not too heavily outnumbered. We do not want to send out gallant pilots to die in a hopeless struggle.

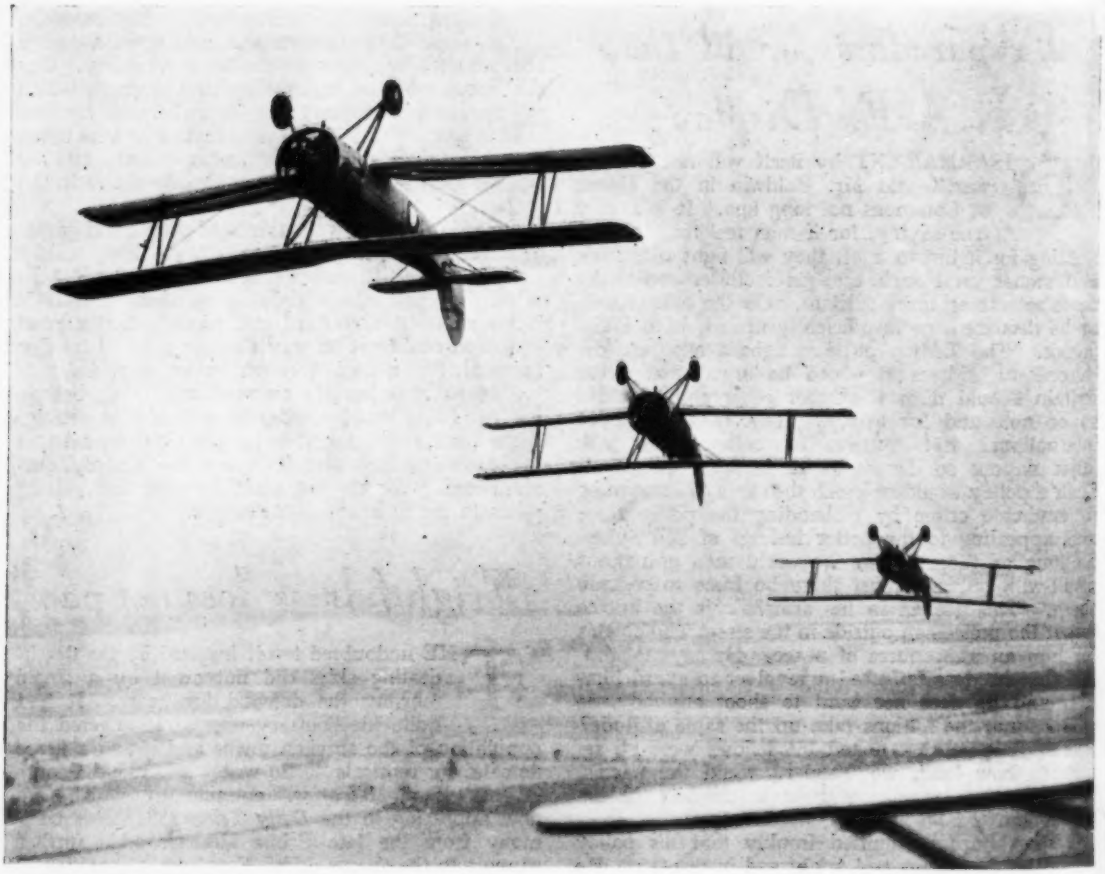
Frightfulness does not pay

"THE undoubted terror inspired by the death-dealing skies did not swell by a single murmur the demand for peace. It had quite the contrary effect. It angered the population of the stricken towns and led to a fierce demand for reprisals." So writes Mr. Lloyd George in his *War Memories*, extracts of which are now appearing in the *Daily Telegraph*. This testimony from the late Prime Minister adds further support to the theory which FLIGHT has consistently advanced, that "frightfulness" does not beat a virile nation to its knees. It only exasperates it. History amply supports this view, but Mr. Lloyd George's testimony is particularly to the point.

It follows that all the talk which we have heard of "striking at nerve centres" and driving the voters to force their Government into surrender, are mere wind without substance. As has been said, and Mr. Winston Churchill quoted the saying in a great speech on the subject, a bomb dropped on civilians is a good bomb wasted. Air Marshal Sir John Steel, too, when he commanded the Wessex Bombing Area, said that there was a great deal of nonsense talked about killing women and children. All the orders he had given to his squadrons (on Air Exercises) were to attack military objectives, things which the guns would destroy if they could reach them. Otherwise, his officers, if captured, would be liable to be treated as war criminals.

It is well to remember this on the day of the Royal Air Force Display. We are all tremendously proud of our Royal Air Force, we rejoice in the manifestation of its power, and we are thrilled at the beauty and daring of its flying. It would be a sorry thought that these splendid officers, splendid machines, splendid squadrons, existed mainly for the purpose of slaying helpless women and children. Pacifists, cranks, and certain wrong-headed exponents of what is called the extreme air school, tell us that that is the case. Some pacifists have tried in previous years to hold meetings at Hendon on the Display day and to rouse an outcry against the existence of our Air Force and any Air Force. If the facts which they allege were correct, we could hardly deny them some sympathy. Fortunately it is not the case that Air Forces exist for slaughtering civilians, or that any Government which retains a modicum of sense would try so to misuse them. Bombers are but long-range artillery, and the set piece in this year's Display will show what useful work they can do by destroying an enemy magazine which is out of the range of the guns. To say that there is anything wrong in using bomber aeroplanes to destroy such a magazine is to show complete ignorance of what is legitimate and what is illegal in the practice of warfare. No edict from Geneva, even if such a one were issued, could or would prevent such a perfectly reasonable exercise of air power. But to attack civilians from the air would be a mistake as well as a crime. Let Geneva put this down in a formal agreement, and Geneva will have done good work.

INVERTED



COULD PEGOUD HAVE FORESEEN THIS? Before he made the first loop, it is said that the French pilot Pégoud had himself strapped upside down to a bench to grow accustomed to the sensation. These instructors of the Central Flying School at Wittering seem quite at home in their inverted Avro "Tutors," in which they will perform at the R.A.F. Display.

The Outlook

A Running Commentary on Air Topics

Landing in Fog

FOR air transport to be an all the year round business, airliners must be able to land with perfect safety when the visibility, due to fog or other bad weather conditions, is practically nothing. Extensive experiments, which are so far extremely successful, are being carried out both at the Tempelhof Aerodrome in Berlin by the Deutsche Luft Hansa people and also in Holland by the K.L.M. authorities. Over here a certain amount has been done, but it is a subject which is of the utmost importance, and on which incessant research should be carried out.

Real Commercial Aviation

COMMERCIAL aviation is a very different matter from civil aviation. That is to say, it must not have idle plant of any description. In the past, aeroplanes and flying boats have been looked upon as pieces of machinery which were prone to break down frequently, and therefore it was necessary to have several machines in reserve if any particular line was to be flown over with unfailing regularity. Imperial Airways have proved that this view is wrong. They have, for example, maintained the service between Brindisi and Cairo on a schedule of two machines each way every week, with only three flying boats of the Short "Scipio" class. People may be tempted to think that that is cutting the margin of safety too fine. Imperial Airways think otherwise. In these Short boats they have got their maintenance down to little more than is necessary for ships. Engines are changed periodically, but the boats themselves, with their stainless-steel bottoms, require very little attention, and so the line goes on with a regularity which is the envy of all other airline companies throughout the world. Soon, we hope, the line will run from Marseilles instead of Brindisi, but we do not expect that it will be found necessary to increase the fleet because of this. One or two of the old and well-tried "Calcutta" boats are always kept ready at Alexandria for special jobs, and no doubt they could be requisitioned in case of need.

The First Channel Flight

ON another page an account is given of the celebrations held in France last Saturday in honour of the twenty-fifth anniversary of Blériot's first flight across the Channel. The curious fact is that 25 years have not yet elapsed since that historic flight. It was on July 25, 1909, that Louis Blériot risked his life in trusting to a rather temperamental 25-h.p. Anzani engine and an outpaced destroyer. This particular celebration has missed the quarter of a century by one month and two days.

The R.A.F. Display, 1934

A NICELY balanced programme has been drawn up for the R.A.F. Display at Hendon this year. From 12.30 to 17.30 hours the public will be continuously interested and diverted by a series of events which show the very high pitch of training attained by the Royal Air Force. In all there are 20 events on the programme, the most important of which begin at 15.00 hours, but those in the morning will also be full of interest and beauty. It is important to make a note of this fact, for the crowd is always so great at Hendon on this occasion that wise spectators make a point of arriving early, and many of them bring their lunch with them. Those who do so need not fear that the time will hang heavy on their hands. Air racing, aerobatics, clever fooling, refuelling in the air, and practice in shooting at a towed target will be the fare for the morning, and these events by themselves would make a good day's enjoyment for most spectators.

In the afternoon the interest increases, when the great wing of fast day bombers goes through its evolutions, the intercepter "Furies" of two squadrons dazzle the eyes with their rapid and really marvellous manœuvres, the parachutes flutter down, the stately flying boats pass overhead, the coloured smoke writes intricate patterns over the sky, and finally the powder magazine of the infamous enemies of Great Britain is blown sky-high in spite of all the efforts of its defenders to drive off the bombers and fighters of the R.A.F. The Prince of Wales, himself an Air Marshal, will be present, and who could deny that the above fare is a dainty dish to set before the son of a King?

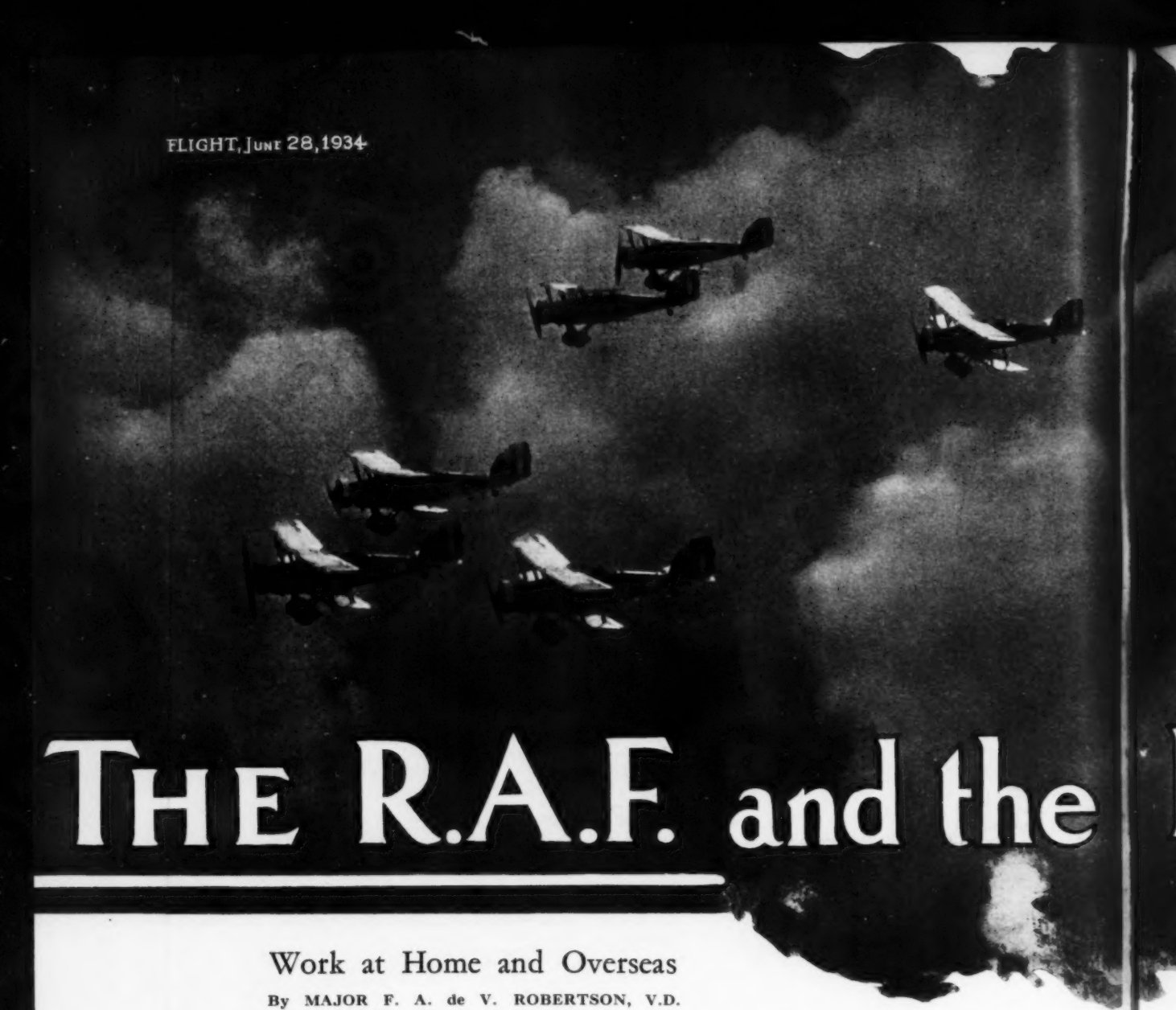
One of the most remarkable things about the Display each year is the promptitude with which each event is brought off precisely at the time advertised in the programme. Formations take off and disappear for a while into the blue. Then as the clock marks the time for their event to begin, we find them flying over the aerodrome like an actor taking his cue. This means a tremendous lot of preparation and practice, and a Force which can work through such a programme without a hitch is a Force which has been brought up to a very high degree of discipline.

Work on the programme of the Display starts months before the date fixed for the performance. So early as last October the staff of the Fighting Area prepared a list of 40 suggested events and submitted it to the Commander-in-Chief of Air Defence of Great Britain. In choosing events for the Display, two considerations have to be borne in mind. In the first place the Display is not merely a show for the public. It is the supreme point of the year's training of the R.A.F., and every event must bear some relation to that training. Some of the events are made to wear a humorous aspect, and the antics of pretended pupils learning to fly and mismanaging their aeroplanes have raised loud laughter. But none the less each item has some bearing on the training of the Air Force for its work. Secondly, the Display takes the taxpayer into the confidence of the Air Ministry, and shows him something of what he gets for his moderate expenditure on the Air Estimates. The events must be attractive to the public, and it is quite necessary for the Committee to practise the arts of showmanship. Incidentally, the Display must pay for itself, and is expected to hand over a handsome balance to Service charities.

In choosing the items for the Display, the Committee must consider the dates at which squadrons have to go to armament training camp for their annual course with live ammunition and bombs, and other considerations of the same sort. At last so many squadrons are chosen to appear at Hendon, and each is given its own event to practise. Early in March the Committee commences to meet fortnightly and to settle the detailed arrangements. Various sub-committees are formed, for instance, the Flying Committee under a senior officer. It is their duty, among other things, to see that, while the events are attractive, nothing dangerous is attempted. Rehearsals start six weeks before the Display. The aerodrome management must be of the best if rigid punctuality is to be observed, and practising this is in itself a most valuable training in staff work. Everything must be co-ordinated, and each sub-committee must produce its own results and fit them in with all the other results. At the same time a separate programme must be prepared and practised for adoption if the weather is bad. This had to be used for several events last year, but we hope it will not be necessary again.

There is only one point on which we have ever heard serious criticism of the Display organisation, and that point was catering. It is a very difficult matter to feed huge multitudes out in the wilderness, but we hope the efforts will be more successful this year. As we said above, the wise will bring a packet of sandwiches and a thermos—but please, oh please, no oranges!

A last word to the spectators. Do not stand on the chairs.



THE R.A.F. and the

Work at Home and Overseas

By MAJOR F. A. de V. ROBERTSON, V.D.

ENJOYMENT is probably the main idea of the vast crowds which come each year to Hendon to witness the Royal Air Force Display. Nowhere else in the world can such a beautiful exhibition of flying be seen. If the weather is kind and the sun shines (though many prefer that it should not shine too strongly) the scene is one of brightness and gaiety such as can only be equalled on Epsom Downs on Derby Day and at Henley Regatta. Yet the R.A.F. Display is a serious affair. It is, for one thing, the culminating point of the year's training of the various units of the Service.

This year a special interest attaches to the study of air power, for the Disarmament Conference has been adjourned *sine die*, and no one knows if it will ever reassemble. FLIGHT has never believed that that Conference could do much good, for, as Mr. Baldwin truly said, disarmament by itself will not prevent war. In particular, the proposals to abolish all Air Forces were particularly fatuous, as such agreements would be inevitably, and quite justifiably, disregarded the very moment that war broke out. One might just as well ordain that a soldier fighting in a trench should observe all the rules of the prize boxing ring. Good work may still be done by the Air Committee of the Conference which remains in being, by agreeing to forbid deliberate attacks on civil populations, which no one in the world wants to see carried out. If honour and humanity did not secure the observance of such an agreement, still the same effect would be produced by fear of reprisals—and anyway it is obviously more profitable to drop a bomb on a powder magazine (as will be done in the last event of the Display) than to drop it on a lot of women and children, even though some of them may be munition workers.

No. 1 (Fighter) Squadron

The Disarmament Conference has had one effect. It has drawn wide attention to the small number of air squadrons posssessed by the British Empire. In the last Air Estimates passed by Parliament it was decided to increase the practical working

No. 2 (Army Co-operation) Squadron

strength of our Home Defence Force by four squadrons. Already steps have been taken to put this into effect. The two "paper" units, Nos. 15 and 22 (Bomber) Squadrons, have been formed into operating squadrons and have been stationed at Abingdon and at Donibristle (in Fife) respectively. One new squadron, No. 142 (Bomber) Squadron, has been raised and stationed at Netheravon on Salisbury Plain. The fourth squadron will doubtless be formed before long.

It is certain that everyone who sees the flying next Saturday will agree that though our Air force is small in numbers, it is excellent in quality.

No. 3 (Fighter) Squadron

The Display shows examples of various forms of R.A.F. work, but it cannot show them all. This article is an attempt to tell the story of the Royal Air Force where the Display cannot tell it.

THE R.A.F. AT HOME

AIR DEFENCE OF GREAT BRITAIN

In the United Kingdom the Royal Air Force is divided up into five so-called Commands. These are:—Air Defence of Great Britain (known as A.D.G.B.), Inland Area, Coastal Area, Cranwell, and Halton. The last two are educational institutions and deal with the Cranwell Cadet College and with two schools for aircraft apprentices.

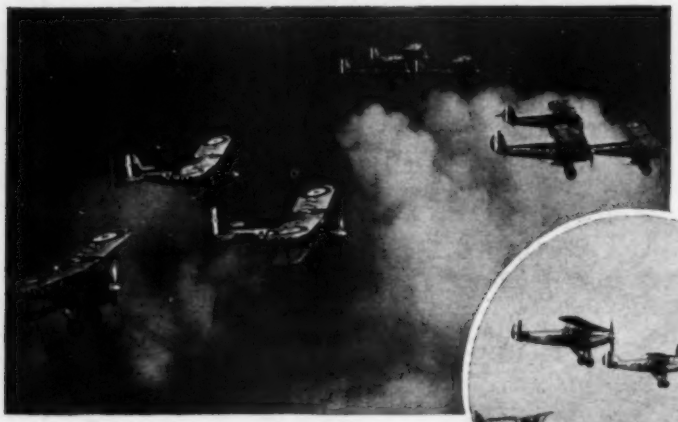
The question is sometimes asked: Why do we need a separate Service and a separate Ministry for the air? Would it not be better to do as France and the United States do, and have one air arm for the Army and another for the Navy? The answer to that question may be given in four letters—A.D.G.B.

London, though safe from attack by sea, is very open to attack by air. For that reason, the air defence of London in particular, and Great Britain in general, needs the most special care and energy.

The Command, Air Defence of Great Britain, is under an Air Officer Commanding-in-Chief, and the present C.-in-C. is Air-Marshal Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C. The Command is divided into three areas and one group, namely, the Western Area, the Central Area, the Fighting Area, and No. 1 Air Defence Group.

No. 4 (Army Co-operation) Squadron

5 (*Army Co-operation*) Sqn. 6 (*Bomber*) Sqn. 7 (*Bomber*) Sqn. 8 (*Bomber*) Sqn. 9 (*Bomber*) Sqn.



"Bulldogs" ("Jupiter") of No. 19 (Fighter) Squadron and "Furies" ("Kestrel") of No. 43 (Fighter) Squadron. (FLIGHT *Photo.*)

The Western Area

The Western Area has headquarters at Andover, and is commanded by Air Vice-Marshal P. H. L. Playfair, C.B., M.C. The units in the Area are:—

No.	Unit	Station	Aircraft	Engine	Function	Notes
12	Bomber Squadron	Andover	12 "Hart"	Kestrel	Day Bomber	Regular
101	,,	,,	8 "Sidestrand"	2 Jupiter	,,	,,
7	,,	Worthy Down	10 "Virginia"	2 Lion	Night Bomber	,,
58	,,	,,	10 ,,	,,	,,	,,
9	,,	Boscombe Down	10 ,,	,,	,,	,,
10	,,	,,	10 ,,	,,	,,	,,
500	,,	Manston (Kent)	10 ,,	,,	,,	Cadre
502	,,	Aldergrove (Ulster)	10 ,,	,,	,,	,,
503	,,	Waddington (Lincoln)	10 "Hinaidi"	2 Jupiter	,,	,,
			90 aircraft.			

The Western Area also administers some other units, such as the Staff College at Andover, and the Station Flight at the same station which enables staff officers to keep in flying training.

The term Cadre Squadron will be noticed in the above list. It means a squadron in which the commanding officer, most of the headquarters, and one flight are composed of regular officers and airmen, while the remainder belong to the Special Reserve Air Force, men who earn their living in civil occupations and serve with their squadrons in their spare time. Auxiliary Air Force squadrons are dealt with below.

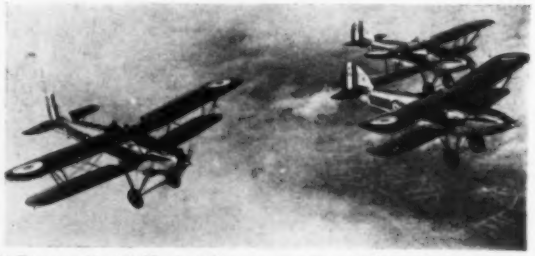
It is worthy of note that there are two classes of squadron in which citizen officers and airmen can serve their country. In the Cadre squadrons the link with the regulars is very close, and the traditions and atmosphere are practically the same as in a regular unit. In the Auxiliary Air Force the non-regular element is strongly predominant. Both classes of squadron have definite places in the Home Defence Force.

The Central Area

The Central Area has headquarters at Abingdon, and is commanded by Air Commodore H. B. Nicholl, C.B.E. It comprises the eleven squadrons enumerated in the table below:—

The Central Area also administers the Oxford University Air Squadron, which is a sort of Officers' Training Corps, and the Abingdon Station Flight, which caters for that squadron.

No.	Unit	Station	Aircraft	Engine	Function	Notes
33	Bomber Squadron	Bicester	12 "Hart"	Kestrel	Day Bomber	Regular
18	,,	Upper Heyford	12 ,,	,,	,,	,,
57	,,	,,	12 ,,	,,	,,	,,
142	,,	Netheravon	12 ,,	,,	,,	,,
40	,,	Abingdon	12 "Gordon"	Panther	,,	,,
15	,,	,,	12 "Hart"	Kestrel	,,	,,
35	,,	Bircham Newton	12 "Gordon"	Panther	,,	,,
207	,,	,,	12 ,,	,,	,,	,,
501	,,	Filton (Bristol)	12 "Wallace"	Pegasus	,,	Cadre
504	,,	Hucknall (Nottingham)	12 ,,	,,	,,	,,
99	,,	Upper Heyford	10 "Hinaidi"	2 Jupiter	Night Bomber	Regular
			130 aircraft			



"Demon" ("Kestrel") two-seater fighters of No. 23 (Fighter) Squadron. (FLIGHT *Photo.*)

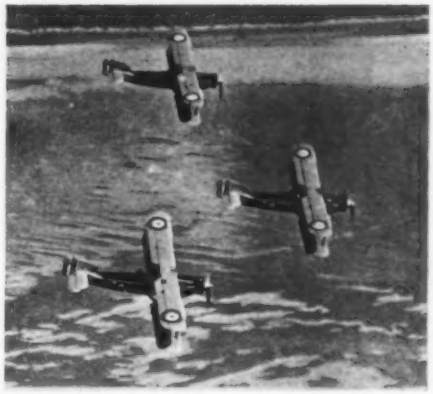
10 (*Bomber*) Sqn. 12 (*Bomber*) Sqn. 13 (*Army Co-operation*) Sqn. 14 (*Bomber*) Sqn. 16 (*Army Co-operation*) Sqn.

17 (*Fighter*) Sqn. 19 (*Fighter*) Sqn. 20 (*Army Co-operation*) Sqn. 23 (*Fighter*) Sqn. 24 (*Communications*) Sqn. 25 (*Fighter*) Sqn.

The Fighting Area

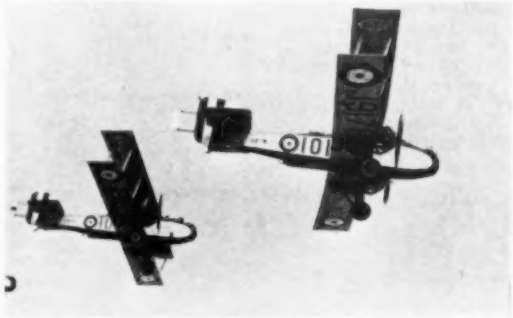
The Fighting Area consists of 13 fighter squadrons, and also administers the Cambridge University Air Squadron, and the Duxford Station Flight which caters for it, and several other detached flights. The Area is commanded by Air Vice-Marshal P. B. Joubert de la Ferté, C.M.G., D.S.O., who has his headquarters at Uxbridge. The squadrons are all regular. All the machines are single-seaters except the "Demon," which is a two-seater.

	Unit	Station		Aircraft	Engine
No. 1	Fighter Squadron	Tangmere ..	12	"Fury" ..	Kestrel
43	"	.. ..	12	" ..	"
25	"	Hawkinge ..	12	" ..	"
3	"	Kenley ..	12	"Bulldog" ..	Jupiter
17	"	.. ..	12	" ..	"
19	"	Duxford ..	12	" ..	"
29	"	North Weald	12	" ..	"
56	"	..	12	" ..	"
32	"	Biggin Hill ..	12	" ..	"
41	"	Northolt ..	12	" ..	"
54	"	Hornchurch	12	" ..	"
111	"	..	12	" ..	"
23	"	Biggin Hill ..	12	"Demon" ..	Kestrel
			156	aircraft.	



"Gordon" ("Panther") day bombers of No. 35 (Bomber) Squadron. (FLIGHT *Photo.*)

It has been decided to re-equip No. 41 (Fighter) Squadron with two-seater "Demons" in the near future. The three squadrons which have the "Fury" are known as interceptors. They have an exceptionally rapid climb to great heights and great speed at those heights. Their tanks allow them to stay in the air about 1 hour 50 minutes on an average. The "Bulldog" has for some years past been our standard day-and-night fighter, and has an average endurance in the air of 2 hours 30 minutes. For work at night a somewhat longer endurance is needed than is necessary by day, as the fighter patrols must be up (they fly singly by night and not in formation) before an enemy raid comes overhead, so that they are ready to attack the moment that the beams of the searchlights show up the raiding bomber. But the "Bulldog" must now be considered as obsolescent, and the Gloster "Gauntlet" with "Mercury" engine has been chosen to replace it. This machine has the amazing top speed of 228 m.p.h. at 15,000 feet.



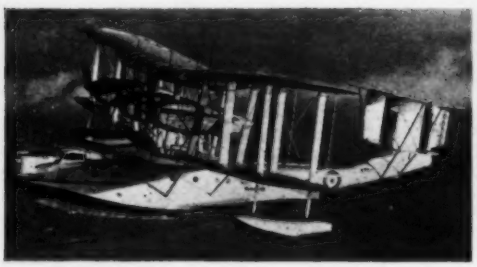
TWIN-ENGINED BOMBERS: "Sidestrands" ("Jupiter") of No. 101 (Bomber) Squadron. (FLIGHT *Photo.*)

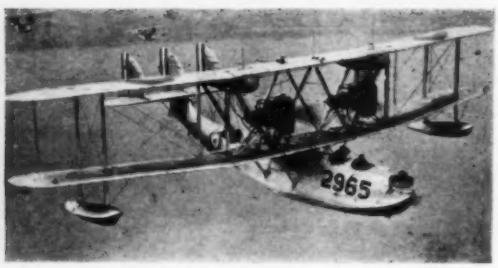
The Fighting Area works in close co-operation with the Observers' Corps, volunteer special constables who take up observation posts round the London area and send in prompt reports of each raid which crosses the coast. The Fighting Area must also work with the anti-aircraft batteries of the Territorial Army Royal Artillery and the searchlight groups of the Territorial Army Royal Engineers. Specimens of the guns, searchlights, and sound-locators belonging to the Territorial Army will be on view at Hendon during the Display. It is a maxim of air defence that at night there can be no interception of raiders without successful work by the searchlights. It is fairly obvious that 13 fighter squadrons are all too small a force to defend the whole of the London area continuously by day and night for any length of time. We badly need more fighter squadrons.

NIGHT BOMBERS: Twin-engined "Heyfords" ("Kestrel") of No. 99 (Bomber) Squadron. (FLIGHT *Photo.*)

26 (*Army Co-operation*) Sqn. 27 (*Bomber*) Sqn. 28 (*Army Co-operation*) Sqn. 29 (*Fighter*) Sqn. 30 (*Bomber*) Sqn. 32 (*Fighter*) Sqn.

33 (*Bomber*) Sqn. 35 (*Bomber*) Sqn. 36 (*Torpedo-Bomber*) Sqn. 40 (*Bomber*) Sqn. 41 (*Fighter*) Sqn. 43 (*Fighter*) Sqn





TWO TYPES OF LONG-RANGE FLYING BOATS FOR COAST DEFENCE: On the left is a "Perth" (three "Buzzards") of No. 209 (F.B.) Squadron at Mount Batten, and on the right a "Southampton" (two "Lions") of No. 201 (F.B.) Squadron at Calshot. (FLIGHT *Photo.*)

No. 1 Air Defence Group

Mention was made above of the Cadre squadrons, in which there is a proportion of non-regular officers and airmen. In addition there is the Auxiliary Air Force, which corresponds closely to the Territorial Army. The A.A.F. squadrons are commanded and mainly manned by citizen airmen, though there is in each squadron a small nucleus of regulars. At present there are eight A.A.F. squadrons, and they are all under No. 1 Air Defence Group. This Group is commanded by Air Commodore J. E. A. Baldwin, D.S.O., O.B.E., and the headquarters are at 33-34, Tavistock Place, London, W.C.1. The squadrons are:—

Unit	Station	Aircraft		Engine
600 (City of London) Bomber Sqdn.	Hendon ..	12	"Hart" ..	Kestrel
601 (County of London) ,,	,, ..	12	,, ..	,,
602 (City of Glasgow) ,,	Abbotsinch	12	,, ..	,,
603 (City of Edinburgh) ,,	Turnhouse	12	"Wapiti"	Jupiter
604 (County of Middlesex) ,,	Hendon ..	12	,,	,,
605 (County of Warwick) ,,	Castle Bromwich	12	,,	,,
607 (County of Durham) ,,	Usworth ..	12	,,	,,
608 (North Riding) ,,	Thornaby	12	,,	,,
		96	aircraft.	

A Fairey III.F floatplane on the catapult of the cruiser H.M.S. *Exeter*. Catapult floatplanes belong to flights of the Fleet Air Arm. (FLIGHT *Photo.*)

No. 1 Air Defence Group also administers No. 24 (Communications) Squadron, which is stationed at Hendon with a detached flight at Northolt. This squadron is not a fighting unit, but provides air transport for senior officers, etc. It is, of course, quite necessary that such transport should be provided.

The Command, A.D.G.B., thus has at its disposal:—

Western Area ..	9	squadrons ..	90	aircraft.
Central Area ..	11	,, ..	130	,,
Fighting Area ..	13	,, ..	156	,,
No. 1 A.D. Group	8	,, ..	96	,,
	41	,, ..	472	,,

Some notes are required on these figures. It has often been stated that the strength of our Home Defence Force was 42 squadrons, and the last Air Estimates added two more new squadrons, as well as converting two "paper" squadrons which already existed. So the present strength ought to be 44 squadrons. We have to account for three squadrons which

45 (*Bomber*) Sqn. 47 (*Bomber*) Sqn. 54 (*Fighter*) Sqn. 55 (*Bomber*) Sqn. 56 (*Fighter*) Sqn. 57 (*Bomber*) Sqn.

58 (*Bomber*) *Sqn.* 70 (*Bomber-Transport*) *Sqn.* 84 (*Bomber*) *Sqn.* 100 (*Bomber*) *Sqn.* 101 (*Bomber*) *Sqn.*

do not appear in the above figures. One of the new ones has not yet been raised. One squadron which is counted in the Home Defence Force has been placed under the charge of the Coastal Area (as shown below), while a third squadron, No. 100 (Bomber) Squadron, has been lent for the time being to the Far East Command, and is stationed at Singapore.

The Coastal Area

The Coastal Area is the direct descendant of the old Royal Naval Air Service. It is in charge of the squadrons and flights of the Fleet Air Arm ashore and afloat unless they come under one of the overseas Commands. It is also in charge of the squadrons of flying boats for coast defence which are stationed in Great Britain. As stated above, it has also under its command No. 22 (Bomber) Squadron, which is stationed at Donibristle in Fife, although this squadron is reckoned part of the Home Defence Force. Another very important feature of this Command is the Marine Aircraft Experimental Establishment at Felixstowe. The School of Naval Co-operation at Lee-on-the Solent comes under the Coastal Area, as well as the Base Training Squadron at Gosport and the Training Squadron and Navigation School at Calshot. The headquarters of the Coastal Area are at Lee-on-the Solent, and the Air Officer Commanding is Air Marshal Sir Robert Clark-Hall, K.B.E., C.M.G., D.S.O.

A Kite Balloon from Larkhill, which is used for Army Co-operation work. (FLIGHT *Photo.*)

The squadrons of flying boats stationed in this country are:—

Unit		Station		Aircraft	Engine
201 Flying Boat Sqdn.		Calshot	5	"Southampton"	2 Lion
204	,,	Mount Batten	4	,,	,,
209	,,	,,	3	"Iris"	3 Buzzard
210	,,	Pembroke Dock	4	"Southampton"	2 Lion
			16	aircraft.	

The squadrons and flights of the Fleet Air Arm have no permanent stations. The squadrons go to sea in carriers, and take off from and land on the decks. The flights are equipped with twin-float seaplanes, which are carried on cruisers and capital ships, from which they are launched by catapult. On returning they alight in the water beside the vessel and are lifted on board by a crane.

An Army Co-operation "Atlas" ("Jaguar") picking up a message. The "Atlas" is used by 208 (A-C) Squadron at Heliopolis, Egypt. In Great Britain the type used for this work is the "Audax" ("Kestrel"). (FLIGHT *Photo.*)

The F.A.A. squadrons at present administered by Coastal Area are those on H.M.S. *Courageous* and *Furious*, namely:—

Unit		*Courageous* Aircraft	Engine	Notes
800 Fleet Fighter Sqdn.	9	"Nimrod"	Kestrel	Single-seater fighter
	3	"Osprey"	,,	Two-seater fighter reconnaissance
810 Fleet Torpedo-Bomber Sqdn.	6	"Dart"	Lion	Single-seater
	6	"Ripon"	,,	Two-seater

AN AIRCRAFT CARRIER, H.M.S, *FURIOUS*: Note the flush deck and the smoke issuing at the stern from horizontal funnels. (FLIGHT *Photo.*)

111 (*Fighter*) *Sqn.* 201 (*Flying Boat*) *Sqn.* 202 (*Flying Boat*) *Sqn.* 204 (*Flying Boat*) *Sqn.* 209 (*Flying Boat*) *Sqn.*

210 (*Flying Boat*) Sqn. 216 (*Bomber-Transport*) Sqn. 500 (*County of Kent*) (*Bomber*) Sqn. 501 *City of Bristol*) (*Bomber*) Sqn. 502 (*Ulster*) (*Bomber*) Sqn.

IN INDIA: A line-up of the "Harts" ("Kestrel") of No. 11 (Bomber) Squadron at Risalpur for inspection by Air Marshal Sir John Steel.

	Unit		Aircraft	Engine	Notes
820	Fleet Spotter-Reconnaissance Sqdn.	3	"Seal"	Panther	"
821	" "	9	"Seal"	"	"
		42	aircraft.		
			Furious		
801	Fleet Fighter Sqdn.	6	"Nimrod"	Kestrel	Single-seater fighter
		3	"Osprey"	"	Two-seater fighter reconnaissance
811	Flight Torpedo-Bomber Sqdn.	12	"Ripon"	Lion ..	Two-seater
822	Flight Spotter-Reconnaissance	12	"3 F" ..	" ..	Three-seater
		33	aircraft.		

It will be convenient to give here the other units of the Fleet Air Arm, as they all come under the Coastal Area when they return from foreign service.

	Unit		Aircraft	Engine	Notes
802	Fleet Fighter Sqdn.	9	"Nimrod"	Kestrel	Single-seater fighter
		3	"Osprey"	"	Two-seater fighter reconnaissance
803	F.F. Sqdn. ..	9	"	"	Two-seater
812	F.T.-B. Sqdn. ..	12	"Baffin"	Panther	"
823	F.S.-R. Sqdn. ..	12	"3 F" ..	Lion ..	Three-seater
824	F.S.-R. Sqdn. ..	12	"3 F" ..	"	"
		57	aircraft.		
403	F.F. Flight ..	5	"Osprey"	Kestrel	Two-seater float-plane
406	F.F. " ..	2	"	"	" "
407	F.F. " ..	5	"	"	" "
443	F.S.-R. " ..	5	"3 F"	Lion ..	Three-seater float-plane
444	Fleet Spotter-Reconnaissance	4	" ..	" ..	" "
417	" "	6	"	" ..	" "
		27	aircraft.		
	Total aircraft of Fleet Air Arm				159

As stated above, the Coastal Area administers No. 22 (Bomber) Squadron, though it is reckoned as part of the Home Defence Force. The details of this unit are:—

22 Bomber Squadron, Donibristle: 12 Vildebeests, "Pegasus" two-seater torpedo-bomber.

Total aircraft of Coastal Area:—	
Flying boats	16
In Squadrons on Carriers—	
Courageous	42
Furious	33
In other squadrons	57
In flights	27
In No. 22 (Bomber) Squadron	12
	187

The Inland Area

So far as fighting strength is concerned, the Inland Area is of importance, as it administers the five squadrons which have been allotted for co-operation with the Army and the R.A.F. Balloon Centre at Larkhill. Otherwise it deals in equipment and training, and a multitude of other activities, such as the R.A.F. Central Band. The A.O.C. is Air Vice-Marshal A. M. Longmore, C.B., D.S.O., and the headquarters are at Bentley Priory, Stanmore, Middlesex. The Command is divided into three Groups, No. 22, No. 23, and the Armament Group. All the elaborate organisation of Stores Depôts is under the Inland Area, the Flying Training Schools at Grantham and Sealand, the Aeroplane and Armament Experimental Establishment at Martlesham, the R.A. Establishment at South Farnborough, and numerous other schools for teaching things other than flying. The squadrons administered by the Area are:—

	Unit		Station		Aircraft	Engine
No.	2 Army Co-operation Sqdn.		Manston	12	"Audax" ..	Kestrel
4	" "		S. Farnborough	12	" ..	"
13	" "		Netheravon	12	" ..	"
16	" "		Old Sarum	12	" ..	"
26	" "		Catterick ..	12	" ..	"
				60	aircraft.	

It may be noticed that in giving totals of aircraft in the various Commands we only reckon those which are available for actual warlike operations. We take no count of the machines at the flying training schools, in station flights, and in No. 24 (Communications) Squadron. The number of training machines has an important bearing on our power of rapid expansion, but at the moment these machines add nothing to our air power.

OVERSEAS COMMANDS

Overseas the R.A.F. assumes many different aspects, some of them similar to those which it assumes at Home, and some quite different. In some parts we find the familiar functions of bombing, army co-operation, naval co-operation, and coast defence. In some parts a special duty is to make long-distance flights in formation, with the objects of practising mobility and reinforcement, as well as just "showing the flag" and arousing proper sentiment in outlying colonies. Most unique of all, in three Commands we find the R.A.F. as the primary arm, exercising what is called air control, or control without occupation.

There are three large overseas Commands, Middle East, Iraq, and India, and three smaller ones, Mediterranean, Aden, and Far East.

The Middle East Command

The headquarters of the Middle East Command are at Cairo, and the countries covered by the Command are Egypt, the Sudan, Palestine, and Transjordan. The Air Officer Commanding is Vice-Marshal C. L. N. Newall, C.B., C.M.G., C.B.E., A.M.

In Egypt and the Sudan the functions of the R.A.F. are (1) ordinary bombing, (2) Army co-operation, (3) troop transport, and (4) long-distance flights to other

503 (*County of Lincoln*) (*Bomber*) Sqn. | 504 (*County of Nottingham*) (*Bomber*) Sqn. | 600 (*City of London*) (*Bomber*) Sqn. | 601 (*County of London*) (*Bomber*) Sqn. | 602 (*City of Glasgow*) (*Bomber*) Sqn.

British possessions in Africa or in Asia. The squadrons are:—

	Unit	Station		Aircraft	Engine
No. 208	Army Co-operation Sqdn.	Heliopolis	12	"Atlas" ..	Jaguar
216	Bomber-Transport Sqdn.	,,	12	"Victoria"	2 Lion
6	Bomber Sqdn. (less 1 flight)	Ismailia ..	9	"Gordons"	Panther
45	Bomber Sqdn. ..	Helwan ..	12	"3 F" ..	Lion
47	,, ..	Khartoum	12	"Gordons"	Panther
			57	aircraft.	

For several years past it has been the custom for the Middle East Command to send a formation flight to South Africa, or to either the East African or West African colonies and protectorates. The "Victorias" of the bomber-transport squadron have been used to carry British infantry to Cyprus when riots broke out there, and on another occasion to Iraq when there was trouble with the levies which provided aerodrome guards.

Palestine and Transjordan are organised as a subordinate Command under the Middle East Command, and there the R.A.F. is used as a primary arm. The forces are:—

	Unit	Station		Aircraft	Engine
No. 14	Bomber Sqdn. ..	Amman ..	12	"Gordon"	Panther
1 Flight No. 6	Bomber Sqdn.	Ramleh	3	,,	,,
2	Armoured Car Co.	,,			
			15	aircraft	

In lands where the R.A.F. is the primary arm, there are armoured car companies, which are raised and maintained by the Air Ministry and are manned by R.A.F. officers and men. The cars work in close touch with the aircraft, and the system could not be bettered.

Iraq Command

It was a brilliant brain-wave of Mr. Winston Churchill which led to the R.A.F. being put in supreme control of the defence of Iraq. It has saved the British taxpayer millions of pounds, and it has saved any amount of trouble and bloodshed in the deserts of Iraq. The Air Officer Commanding is now described as commanding the British Forces in Iraq, for if regiments or other units of the Army (probably the Indian Army) have to be used they come under his command. The present A.O.C. is Air Vice-Marshal C. S. Burnett, C.B., C.B.E., D.S.O., and his headquarters are at Hinaidi, outside Baghdad. They will soon be moved to Dhibban, a new station which is being constructed on the Euphrates river. The squadrons in Iraq are:—

TROOP TRANSPORT OVERSEAS: The "Victoria" (two "Lions") carries 25 soldiers and their equipment. It is used by Nos. 216 (Bomber-Transport) Squadron at Heliopolis, Egypt, and No. 70 (B-T) Squadron at Hinaidi, Iraq. (FLIGHT *Photo.*)

EGYPT: A view taken from the air of the famous Pyramids. (FLIGHT *Photo.*)

	Unit	Station		Aircraft	Engine	Notes
No. 30	Bomber Sqdn.	Mosul ..	12	"Wapiti"	Jupiter	
55	,,	Hinaidi	12	,,	,,	
70	Bomber-Transport Sqdn.	,,	12	"Victoria"	2 Lions	Carry 25 troops
84	Bomber Sqdn.	Shaibah ..	12	"Wapiti"	Jupiter	
203	Flying Boat Sqdn.	Basra ..	3	"Rangoon"	3 Jupiter	
			51	aircraft.		

No. 1 Armoured Car Company has 1 section at Mosul, 2 at Hinaidi, and 1 at Margil.

India Command

The responsibility for the defence of India is vested in the Commander-in-Chief of the Army, and though the Air Force sometimes undertakes independent missions on the North West frontier, all the squadrons must be considered as available for work in conjunction with the Army. There are in India eight squadrons, four of bomber aircraft and four for actual Army co-operation machines. There is also an Aircraft Depôt at Karachi and an Aircraft Park at Lahore. The squadrons are organised in three Wings, two of which make one Group. The A.O.C. is Air Marshal Sir John M. Steel, K.B.E., C.B., C.M.G. The units are:—

No. 28 Army Co-operation Sqdn., Ambala, 12 "Wapiti," Jupiter, is under the direct command of India Command.

No. 1 (Indian) Group, Peshawar

No. 20 Army Co-operation Sqdn. Peshawar 12 "Wapiti" Jupiter, is under the direct command of No. 1 Group.

	No. 1 (Indian) Wing—				
No. 27	Bomber Sqdn.	Kohat ..	12	"Wapiti"	Jupiter
60	,,	,, ..	12	,,	,,
	No. 2 (Indian) Wing—				
No. 11	Bomber Sqdn.	Risalpur	12	"Hart"	Kestrel
39	,,	,,	12	,,	,,
	No. 3 (Indian) Wing—				
No. 5	Army Co-operation Sqdn.	Quetta ..	12	"Wapiti"	Jupiter
31	,, ,,	,, ..	12	,,	,,
			96	aircraft.	

603 (*City of Edinburgh*) (*Bomber*) Sqn.

604 (*County of Middlesex*) (*Bomber*) Sqn.

605 (*County of Warwick*) (*Bomber*) Sqn.

607 (*County of Durham*) (*Bomber*) Sqn.

608 (*North Riding*) (*Bomber*) Sqn.

Mediterranean Command

This Command, in brief, means Malta. The headquarters are at Valletta, and the Air Officer Commanding is Air Commodore C. E. H. Rathborne. At the station at Hal Far there is accommodation for units of the Fleet Air Arm in the Mediterranean when they are on shore. At Calafrana is a flying boat station. The Calafrana unit is:—

Unit	Station	Aircraft	Engine	Notes
No. 202 Flying Boat Sqdn.	Malta ..	6 "Fairey 3 F"	Lion ..	Floatplanes
		6 aircraft.		

This squadron has been "temporarily" equipped with floatplanes for a number of years. It is soon to be re-equipped with flying boats, but the type has not yet been settled.

Aden Command

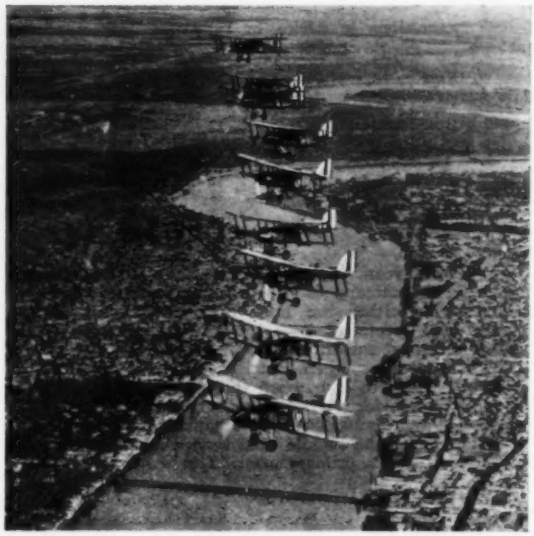
At Aden the Royal Air Force is the primary arm. Group Capt. C. F. A. Portal, D.S.O., M.C., commands. His garrison consists of a section of armoured cars and one squadron:—

No. 8 Bomber Sqdn.	Khormaksar	12 "3 F" ..	Lion	
		12 aircraft.		

Far East Command

Group Capt. Sydney W. Smith, O.B.E., commands the Far East with headquarters at Singapore. The squadrons there are:—

No. 205 Flying Boat Sqdn.	Singapore	4 "Southampton"	2 Lion	Five-seater
36 Torpedo-Bomber Sqdn.	,,	12 "Horsley"	Condor	
100 Bomber Sqdn.	,,	12 "Vildebeest"	Pegasus	
		28 aircraft.		



IN IRAQ: No. 55 (Bomber) Squadron fly their "Wapitis" ("Jupiter") in "echelon, stepped up" across the River Tigris at Baghdad.

No. 100 (Bomber) Squadron has been temporarily sent to Singapore from the Coastal Area. It used to be stationed at Donibristle. Though it is only called a bomber squadron, its "Vildebeests" are torpedo-carrying machines. As stated above, it is reckoned among the 44 squadrons of the Home Defence Force.

With the growth of the naval base it is probable that the air garrison of Singapore may be largely increased. That lies in the lap of the future.

INDIA: Nos. 11 and 39 (Bomber) Squadrons of No. 2 (Indian) Wing from Risalpur regularly fly their "Harts" over the high passes of the Himalayas. They have absolute confidence in their "Kestrel" engines.

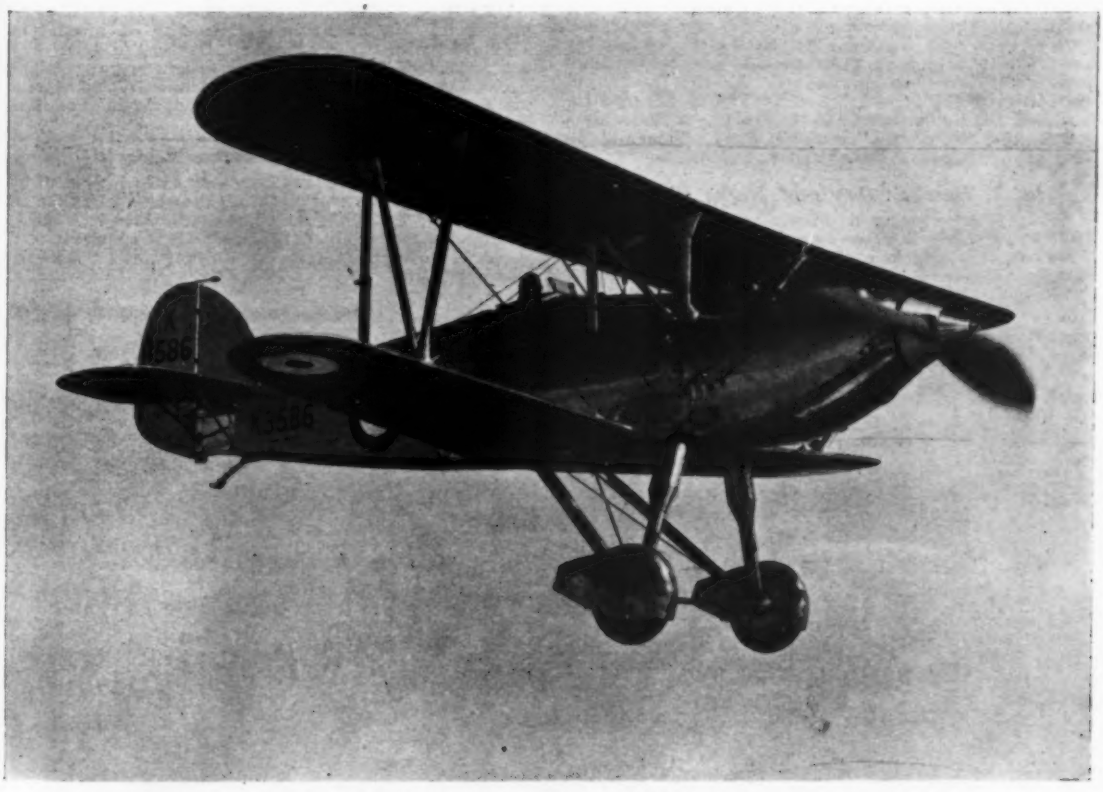
NEW AND EXPERIMENTAL

AS at previous R.A.F. Displays at Hendon, there will be this year an Aircraft Park for such new and experimental machines as have not yet gone into service in the Royal Air Force. There are 16 of these new types, of which 14 are definitely Military Aircraft. These 16 machines take part in the "Fly-Past," and will take off in accordance with the numbers painted on them

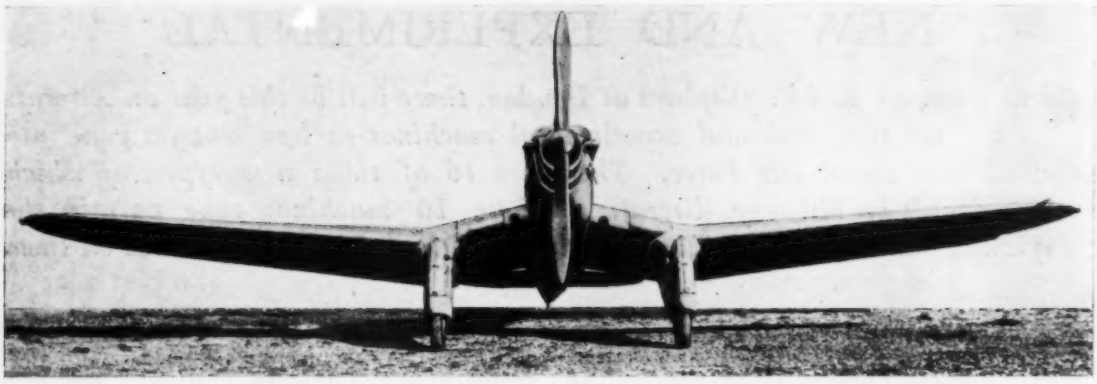
MORE than ordinary interest attaches to the "exhibits" in the New Aircraft Park at the R.A.F. Display this year. Most of the machines are truly "new," and none very "experimental." Six are fitted with entirely modern engines, four with the new Rolls-Royce "Goshawk," one with the new Napier "Dagger" and one with the Bristol "Perseus." Details of these engines are given elsewhere in this issue (see pp. 657-659). The Rolls-Royce "Goshawk" uses a "doped" fuel of 87 Octane Number, which has enabled the power to be raised to 575-600 b.h.p. at an altitude of 11,500 ft. The increase in power has resulted in a corresponding improvement in performance, and the four single-seater fighters fitted with the "Goshawk" will thrill the spectators by their speeds and climbs. These four machines will be the first to emerge from the Park, and may thereby make subsequent types taking the air look "tame" by comparison.

The next new engine type to take off in the "Fly-Past" will be the Napier "Dagger." This is a development of the Napier "Rapier," and is a 24-cyl. air-cooled engine, with the cylinders arranged in the form of a letter "H" as seen from in front, *i.e.*, two banks of 6 cylinders each on top of the crank case and two similar, but inverted, banks below the crank case. The frontal area is very small, and great things are expected from it. The rated power is 610-630 b.h.p. at 3,000 r.p.m. and 10,000 ft.

A third engine which will make its first public appearance at Hendon is the Bristol "Perseus." This is a 9-cyl. air-cooled radial, somewhat resembling the "Pegasus" in a general way, but with sleeve valves in place of the poppet valves. The engine is of approximately 25 litres capacity, and is now produced both as a naturally-aspirated and as a supercharged engine. The power of the "Perseus" is 495-515 b.h.p.



No. 1 : Hawker "High-speed Fury" (Rolls-Royce "Goshawk" engine). (FLIGHT *Photo.*)



No. 2 : Vickers-Supermarine " Spitfire " (Rolls-Royce " Goshawk " engine).

No. 1, Hawker High-Speed " Fury "

This machine is an interceptor fighter, designed to chase and intercept enemy raiders, a function which demands that the aircraft shall be able to attain its operational altitude in a very few minutes, and shall have the highest possible speed at that altitude in order to overtake the raider. The Hawker " High-speed Fury " is a development of the " Super Fury," which had a speed of about 250 m.p.h. It is not known what the speed of the new machine is, but with the " Goshawk " engine it should be a good deal higher. The machine is quite small, having a wing span of 30 ft. only. The engine is steam cooled.

No. 2, Supermarine " Spitfire "

Like the next two machines, the new Vickers-Supermarine " Spitfire " is a day and night fighter, which means that it is carrying a good deal of equipment not demanded of the interceptor fighters, including navigational and night-flying equipment. The machine is an all-metal cantilever monoplane of 46 ft. span, and the wing arrangement is somewhat unusual in that the wing roots have a pronounced anhedral angle where they join the fuselage. Mr. R. J. Mitchell, who designed the famous Schneider Trophy Supermarine machines, has also designed the " Spitfire." A Rolls-Royce steam-cooled " Goshawk " engine is fitted. Four machine guns are carried, as in Nos. 3 and 4.

No. 3, Hawker Day and Night Fighter

Built by the firm as a private venture, the Hawker Day and Night Fighter shows unmistakable Hawker " lines." It is a biplane of 34 ft. wing span, and has its leading edge condensers supplemented by a retractable radiator. As in the case of the other machines of this class, the engine fitted is the Rolls-Royce " Goshawk."

No. 4, Westland Day and Night Fighter

One of the most interesting, because one of the most unorthodox, machines in the class is that designed and built by the Westland Aircraft Works, of Yeovil. In order to give the pilot the best possible view, the positions of engine and pilot have been reversed. The pilot is placed ahead of the wings, and the " Goshawk " engine inside the fuselage, behind him. Transmission is by a shaft from the engine to the airscrew. Where they join the fuselage the wings are swept down, so that the pilot can look back as well as under the wing. The steam condenser is placed under the fuselage. The Westland Day and Night Fighter has a wing span of 38 ft. 6 in.

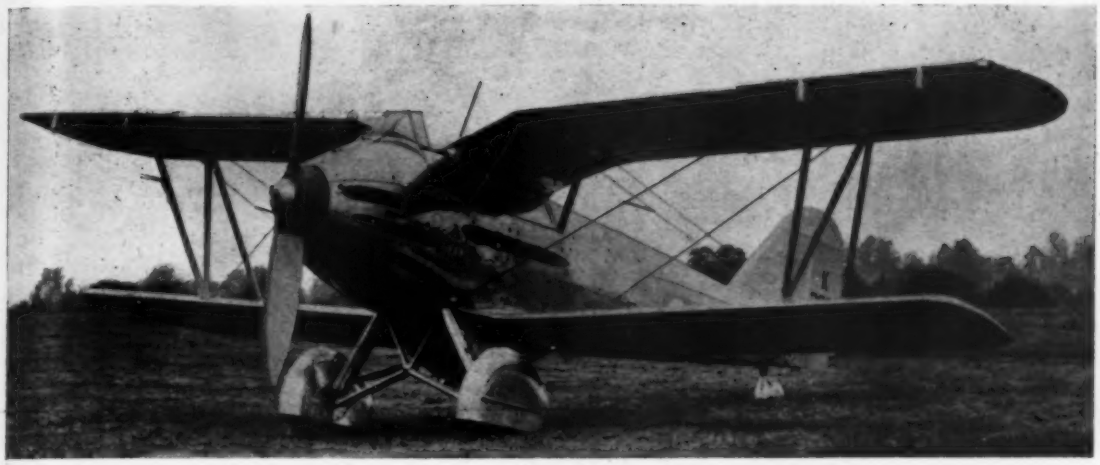
No. 5, Hawker " Dagger-Hart "

A standard machine, except for the engine installation, this " Hart " is, nevertheless, interesting on account of being fitted with the new Napier " Dagger " engine. The high power and small frontal area of this engine combine to give the machine an excellent performance, and visitors to Hendon are advised to watch its flying carefully. The wing span is 37 ft. 3 in.

No. 6, Hawker " Pegasus-Hart "

The Hawker " Hart " has been very extensively used by the R.A.F., and in sub-types it exists in various forms. Machine No. 6 is chiefly of interest because it is fitted with the Bristol 665-h.p. " Pegasus " III M engine, instead of the Rolls-Royce " Kestrel," which forms its standard power plant.

No. 3 : Hawker Day and Night Fighter (Rolls-Royce " Goshawk " engine). (FLIGHT *Photo.*)



No. 4 : Westland Day and Night Fighter (Rolls-Royce " Goshawk " engine).

No. 7, Bristol " Bulldog IV "

At last year's Display a Bristol " Bulldog IV " was shown. It appears again this year, but with a different engine: the Bristol " Perseus " sleeve valve engine. The Bristol Aeroplane Co., Ltd., regards this type of engine as an important part of the firm's programme, and the performance of the machine should be watched with interest, although the cowling will prevent visitors to Hendon from seeing much of the engine itself. The " Bulldog IV " is a day and night fighter, and has a wing span of 33 ft. 8 in.

No. 8, Westland P.V. 3

This is one of the two Westland machines which flew over Mount Everest during the Houston-Everest Expedition. The machine was originally designed as a military type to carry a light torpedo, but was modified for the expedition. The engine is a Bristol 555-h.p. " Pegasus," and the wing span of the machine is 46 ft. 6 in.

No. 9, Westland P.V. 7

Designed for dive bombing, among other duties, this Westland General Purposes machine is a monoplane in which the pilot is seated in front of the wing to give him the best possible view. The design is unusual in that the wing-bracing struts are built up as aerofoil surfaces, and thus contribute a certain amount of lift, while split trailing edge flaps further increase the lift and also act as effective air brakes, so that the machine can be landed at a steep angle in a small area. The wing span is 60 ft. 3 in. and the engine a Bristol 555-h.p. " Pegasus " II M.3.

No. 10, Armstrong-Whitworth A.W. 19

Designed as a private venture to Air Ministry Specification G.4/31, this machine shows some unusual features in the arrangement of its cockpits. It will be seen that the fuselage completely fills the gap between the wings, and that the pilot is placed ahead of, and on a level with, the upper wing, from which position he has an excellent view in all essential directions. The engine is a Siddeley " Tiger " of 670-700 b.h.p. The wing span of the A.W.19 is 49 ft. 8 in.

No. 11, Blackburn B. 6

Belonging to the class known as T.S.R. (Torpedo, Spotter, Reconnaissance), this Blackburn machine has been

No. 5 : Hawker " Hart " (Napier " Dagger " engine). (FLIGHT *Photo.*)

No. 6 : Hawker " Hart " (Bristol " Pegasus " engine). (FLIGHT *Photo.*)

No. 7 : Bristol " Bulldog IV " (Bristol " Perseus " sleeve valve engine).

No. 8 : Westland P.V. 3 Everest machine (Bristol " Pegasus " engine).

designed for topedo operation, bombing, Fleet gunnery spotting, and reconnaissance. As it is intended to operate from an aircraft carrier, the machine has folding wings so that it can be housed in a relatively small space. If desired, a float chassis can be substituted for the wheel undercarriage. The fuselage is of metal *monocoque* construction, and accommodation can be provided for a crew of two or three, according to the duties to be undertaken. The wing span is 46 ft., and the engine a Siddeley " Tiger " of 670-700 b.h.p.

No. 9 : Westland P.V.7 General Purpose machine (Bristol " Pegasus " engine).

No. 10 : Armstrong-Whitworth A.W.19 (Armstrong-Siddeley " Tiger " engine). (FLIGHT *Photo.*)

No. 11 : Blackburn T.S.R. (Armstrong-Siddeley " Tiger " engine).

No. 12 : Fairey General Purpose aircraft (Armstrong-Siddeley " Tiger " engine). (FLIGHT *Photo.*)

No. 12, Fairey P.V. G.4/31

For a number of years the Fairey Aviation Co., Ltd., produced aircraft of the General Purpose type, and considerable numbers were sold abroad. The machine which will be seen in the New Aircraft Park at the Display is the latest Fairey type G.P. aeroplane, and is fitted with a Siddeley " Tiger " engine of 670-700 b.h.p. The wing span is 53 ft. It will be observed that the engine is completely enclosed in a N.A.C.A. cowling. The slope of the fuselage decking is such that, although he is seated fairly far back, the pilot can look over the top of his engine.

No. 13, Boulton & Paul " Overstrand "

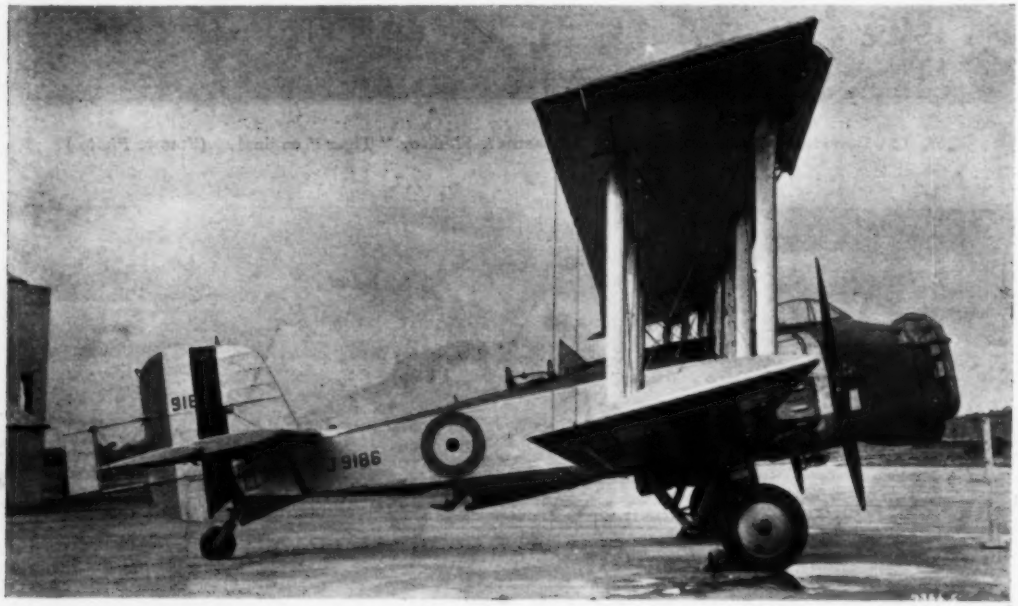
Developed from the well-known " Sidestrand," the new Boulton & Paul " Overstrand " is a twin-engined day bomber of 72 ft. wing span, fitted with two Bristol " Pegasus " I.M.3 555-h.p. engines. Structurally, and in its general layout, the machine follows the lines of the " Sidestrand," but noteworthy features are the transparent roof above the pilot, and the remarkable gun turret in the extreme nose of the fuselage. The " Overstrand " gun turret, shown in the photograph, is so designed that the gunner is protected from wind pressure, and gun and turret are rotated together by mechanical means.

No. 14, Handley-Page " Heyford " Mark II

Although resembling in most of its features the " Heyford " which has recently been issued to the Royal Air Force, the " Heyford " Mark II shows certain detail alterations, such as engine nacelles of improved shape and a transparent roof over the pilot's head. The engines are Rolls-Royce " Kestrels " of 525 h.p. each, and the wing span 75 ft.

No. 15, Cierva Autogiro C. 30 P

At the Display the latest type of direct-control Autogiro will be demonstrated. This is the type C.30 A, fitted with



No. 13 : Boulton & Paul " Overstrand " (two Bristol " Pegasus " engines). (*R.A.F. Official Photograph, Crown Copyright.*)

No. 14 : Handley Page " Heyford," Mark II (two Rolls-Royce " Kestrel " engines). (FLIGHT *Photo.*)

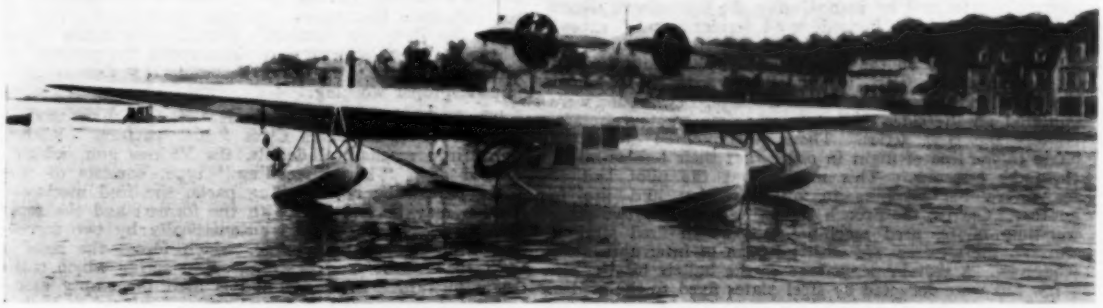
No. 15 : Cierva " Autogiro " (Armstrong-Siddeley " Civet " engine). (FLIGHT *Photo.*)

Siddeley " Civet " engine, civilly known as the 140-h.p. 7-cyl. " Genet Major." Most readers of FLIGHT will be aware by now that the Autogiro depends for its lift upon the rotation of its " windmill " blades. These blades are *not* driven by the engine (except for the initial starting before a flight), but are kept rotating by the air forces upon them. The rotor blades have a diameter of 37 ft.

The machine to be shown at Hendon has no fixed wing and no tail control surfaces. All manœuvres, such as rising, descending, and turning, are carried out by tilting the head of the rotor, which has universal joints. The speed range in level flight is from 15 to 115 m.p.h.

No. 16 Saro " Cloud "

Saunders-Roe, Ltd., of Cowes, have for a number of years specialised on the design and construction of flying boats and amphibian flying boats. The " Cloud " which will be seen in the Display differs from the standard machine in that it has a monospar wing instead of the usual two-spar plywood-covered wing. The main feature of this wing design is that the single spar is placed as near as possible to the centre of pressure position, and the wing is prevented from twisting by a system of wire or tie-rod bracing which forms two spirals. Two Siddeley " Serval " engines of 340 h.p. each are fitted. The wing span is 68 ft.



No. 16 : Saro " Monospar Cloud " (two Armstrong-Siddeley " Serval " engines).

A description of the weapons used in Service Aircraft with a concise history of their Development

By H. F. KING.

IN 1912, Mr. Handley Page, now one of our foremost constructors of civil and military aircraft, wrote to FLIGHT on the subject of the British Military Trials, held that year to find an aeroplane suited to military requirements. He said: "It is well that provision for auxiliary apparatus such as wireless, guns, etc., have been left out. . . . Time enough for these details when aeronautical work has advanced further forward."

This remark demonstrates admirably how much in its infancy was aircraft armament at the outbreak of war. Development during the ensuing four or five years produced efficient machine guns, bombs for a variety of purposes, and torpedoes, with sights, mountings and other equipment necessary for their efficient employment in aircraft. This comparatively rapid growth is somewhat confusing, and, since the war, the subject of aircraft armament has been regarded as being too "hush hush" and technical in character for study by the majority of people outside official circles. We will try to give, therefore, some insight into development and modern practice in the arming of aircraft.

Fixed Guns

Aircraft guns are of two classes, fixed and free. The fixed type is essentially a pilot's weapon, and may be defined as a gun rigidly attached to the structure of an aircraft and trained by manœuvring the machine to which it is fitted. To-day it is used on all Service aircraft, except the large multi-engined types, for aerial combat or for attacking objects on the ground. Before the introduction of synchronising gear, which allows guns to be fired through the airscrew arc without damage, Lewis guns were mounted on the sides of certain war-time tractor aircraft, notably the B.E. series. These guns pointed out at an angle to the line of flight in order that their bullets might clear the airscrew. This meant that the pilot had to manœuvre his machine in one direction and fire in another. Garros, the French "Ace," and one or two other war-time pilots, used machine guns which fired straight through the airscrew arc with no form of interrupter gear whatever. A certain percentage of the bullets hit the airscrew but were deflected by steel plates fixed to the blades. Lewis guns were often fitted to mountings over the top plane, firing above the airscrew.

As early as 1915, Vickers were experimenting with mechanical interrupter gear which allowed a machine gun to be fired through the airscrew arc without any of the bullets hitting the airscrew, and during the following year some Bristol single-seaters were sent to France fitted with this mechanism. Several other makes were tried, but it was not until 1917 that our synchronising gear was superior to that of the enemy. We owe our ultimate superiority to M. Georges Constantinesco, a Rumanian, who had experimented with the transmission of power by waves. He was assisted in developing his gun gear, the modern version of which is shown in our drawing, by some British officers, who also deserve much credit. The first demonstration of Constantinesco synchronising gear was given in August, 1916, on a B.E. aeroplane, and thereafter the gear was fitted to Allied aircraft as quickly as possible.

The Vickers Gun

In the ordinary "land" type of Vickers gun, firing is automatic, but for operation by synchronising gear the firing mechanism is removed and the gun is fired by pressing a trigger on the pilot's control column through pulsations of oil in a system of pipes, in such a manner that no blade of the airscrew is hit by bullets. Constantinesco gear, in a modified form, is standard equipment in the R.A.F. to-day. The Vickers guns used on aircraft during the war, being mere modifications of "land" type guns, were fitted with "speeding-up conversion sets" which increased the rate of fire from about 500 rounds per minute to nearer 900, and made the functioning of the gun at high altitudes more certain. A "disintegrating link" belt was adopted to carry the ammunition. This type of belt is composed of articulated metal links connected by the cartridges themselves. As the cartridges are fired the cases and links are separately ejected down small chutes. Electrical gun heaters were introduced to prevent the lubricant in the gun from becoming so viscous as to impede proper working.

The Vickers guns used in the R.A.F. to-day are modified versions of the Vickers Class "E" pattern. Without going into mechanical details, the Vickers gun, which is classed as a "barrel recoiling" type, consists of three main parts—the non-recoiling parts, the feed mechanism (which may be classified with the former) and the recoiling parts. It is operated automatically by two forces—the explosion of the charge, which forces the recoiling parts backwards, and a strong spiral spring which carries them forward. After a round is fired the empty case is extracted and ejected, a live cartridge is placed in position and a fresh round is brought into the feed block. The

pilot is provided with a "loading handle," which enables him to reload without having to pull the belt through the feed block. The rate of fire is from 750 to 1,000 rounds per minute. A 0.5-in. automatic gun firing a bullet weighing 565 grains is manufactured by Vickers Armstrongs, but is not a standard Service gun.

With the increasing speed of military machines, arrangements are being made to collect the empty cartridge cases and links when they are ejected from the guns, as when they are carried away in the slipstream they are likely to cause damage to the aircraft.

Standard single-seater and two-seater fighters used in the R.A.F. to-day carry two fixed Vickers guns, while all other types using the fixed gun have but one. These guns are usually placed near the engine to reduce the chances of the lubricant freezing. Thus the breeches are accessible to the pilot during an action, and the ammunition boxes are easily replenished through doors in the cowling. There has been a tendency, of late, in several countries to fit "outboard" guns. The term "outboard gun" is taken to mean a gun which fires outside the periphery of the airscrew. This installation offers many advantages, for the maximum rate of fire of the guns is allowed, and the pilot's cockpit is cleared of the guns, belt boxes and reservoir for the synchronising gear. In the majority of aircraft using outboard installations, the guns are mounted in the wings. The Gloster S.S.19 "Multi Gun" fighter, which appeared two or three years ago, carried two Vickers guns in the sides of the fuselage and four Lewis guns mounted in the wings. The lines of fire of the four wing guns converged at a predetermined point in front of the machine, forming a very deadly "cone of fire."

Fixed Gun Sights

Two types of sight are used in the R.A.F. with fixed guns—the "ring and bead" and the Aldis. Fighting aircraft usually mount both on top of the fuselage, in front of the pilot's windscreen. The ring sight consists of a metal ring with a smaller ring inside, supported by radial wires. A bright red bead is so mounted that the ring and bead harmonise with the axis of the guns at a predetermined range, usually about 200 yards in front of the machine. The Aldis sight is a tube containing a series of lens possessing neither magnifying nor diminishing properties. A target, when viewed through the sight, has quite an ordinary appearance. So long as two circles, which are within the ring, are visible, the position of the pilot's eye is immaterial. If he moves his eye slightly, the target appears to move with it. Tracer ammunition is not intended to take the place of sights but to supplement them.

One recently-developed experimental sight consists of an electrically-illuminated graticule reflected on to a mirror in front of the pilot's windscreen. The luminosity may be regulated for varying visibility and different kinds of background.

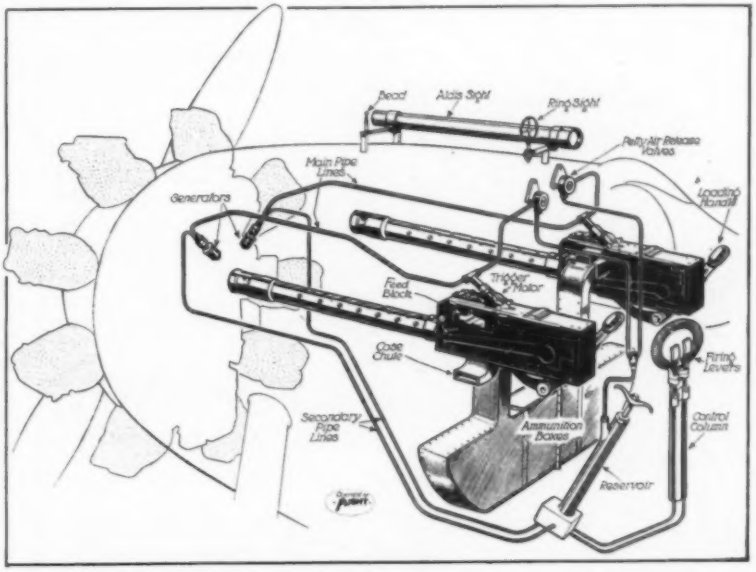
"Camera" guns are used to instruct pilots in the art of using a fixed gun. These are usually mounted on a wing of the machine, and "shoot" photographs instead of bullets.

"Free" Guns

"Free" guns, like fixed guns, were developed from a "land" type. The belts of belt-fed guns are apt to cause obstruction to a gunner operating a movable mounting, so the Lewis drum-fed pattern was chosen during the war as the standard movable gun for use in the R.A.F., which position it still holds. The large barrel casing carrying the cooling fins was deleted, as it was found that the air stream cooled the gun quite sufficiently. Drums holding 97 rounds are used with the Lewis gun, but smaller drums seem to be coming into fashion as the 97-round type is large and heavy to handle at high speeds. The Lewis gun is a "gas-operated" type, and is automatically operated by two forces—the pressure of the gas generated by the explosion and a "return" spring. A pistol grip and trigger are provided beneath the gun, and, instead of the stock used with the "land" gun, a spade grip is fitted. The rate of fire is about 700 rounds a minute.

The mounting of free guns on aircraft proved such a problem during the war that, in 1916, Gen. Trenchard had one experimental machine supplied to each squadron of the R.F.C. so that any ideas that occurred to personnel might be tried out in practice. A remarkably efficient mounting was developed by W/O. Scarff, R.N.A.S., and was adopted as standard equipment. This mounting, in a modified form, is still extensively used. One important alteration made since the war was the fitting of a wind-balancing device, which gives a turning movement equal and opposite to that given by the wind on the guns. Fatigue caused by the rarified air at high altitudes prohibits the use of a mounting requiring much strength during operation. Quite a crop of "high-speed" mountings has appeared during the past few years, the best known examples being the Fairey, Hawker, Avro and an improved type of Vickers-Armstrong. The Fairey pattern scores over the old ring type from several points of view. It is possible to fire directly behind, vertically upwards and downwards, above and below the tail plane, and over the top main plane. The old type caused a serious drop in the performance of fast aircraft, but the Fairey mounting permits the use of an aerodynamically efficient cockpit hooding, and the gun, when not in use, is stowed away in the fairing.

Gunners' positions, in aircraft having speeds of over about 180 m.p.h., demand special attention. In the standard Hawker "Hart" day bomber the gun ring is carried close behind the pilot in more or less the usual manner, but in the "Demon," the fighter version of the "Hart," the gunner's cockpit has been cut away and the ring tilted forward, thus bringing the mounting well below the top line of the fuselage and at an angle to the line of flight. An interesting development is the "parrot cage" on the Bristol 120. A Scarff ring is fitted low in the fuselage. Attached to and revolving with it is a large transparent cupola, a section of which has been omitted to allow the Lewis gun to be used. The Westland Aircraft Works have also evolved a very efficient system of cockpit protection, which was described in FLIGHT of June 14, 1934. The arming of multi-engined aircraft entails the careful placing of guns to procure the best possible fields of fire for defensive purposes. Our latest night bomber, the Handley Page "Heyford," is an excellent example of efficient distribution of armament. Besides the usual cockpit in the nose and the position roughly midway along the fuselage, there is a retractable and rotatable turret (or



A TYPICAL INSTALLATION of twin Vickers guns showing their synchronising gear, ammunition boxes, feed arrangements and sights.

" dustbin ") beneath this latter position. Gun positions at the extreme stern are in vogue in large aeroplanes, especially flying boats, where downward-firing guns in the hull are, in most cases, impracticable. In the Boulton & Paul " Overstrand " a turret is provided in the nose and another position, in which the gunner lies flat on his stomach and operates a gun on a special mounting, is beneath the fuselage.

Sights for " Free " Guns

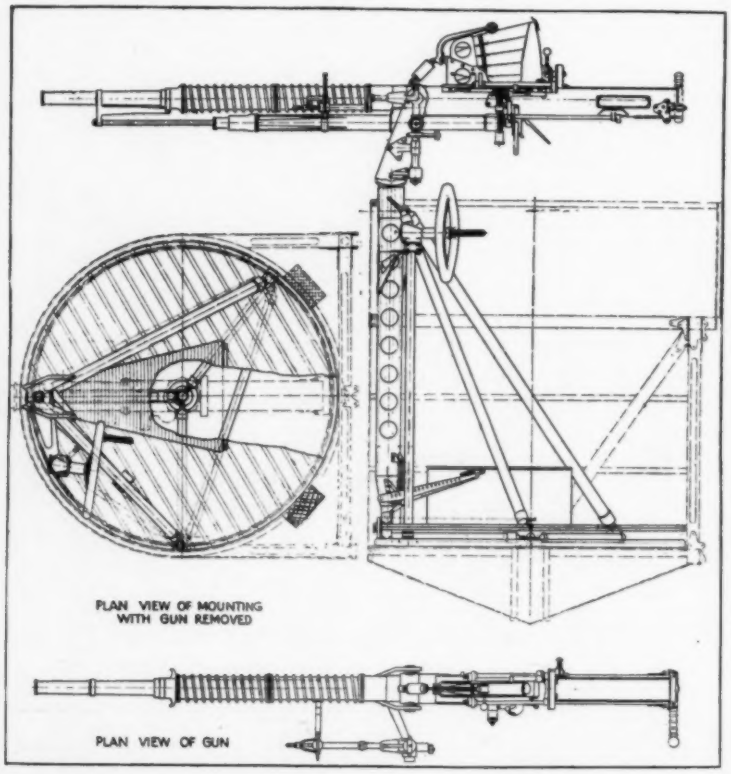
Many problems are present in the design of sights for use with " free " guns. Means have to be devised to compensate for the speed of the aircraft from which the gun is being fired, and for the " principle of deflection," which lays down that when an enemy aircraft is flying across the gunner's line of fire, the gun must be aimed some distance ahead to allow for the movement of the enemy during the time in which the bullet is travelling from the gun to the target. The Norman vane sight is used for this purpose. This consists of a bead and vane mounted on each side of a central rotating pillar. Gimbals are provided to allow for vertical and lateral movement. The slipstream acts on the vane so that its axis is always parallel to the line of flight. Further back on the gun is a ring sight arranged to give correction for " enemy's speed." The Norman vane sight was developed during the war, and, for modern requirements leaves much to be desired, so that mechanically-controlled sights are being developed. For training, camera guns on standard mountings are employed.

Heavy Guns

Guns firing shells are now being mounted as standard equipment on certain types of military aircraft. This type of armament is by no means new, for as early as July, 1913, some automatic guns (two 1-pounders and one 1½-pounder) were tried out. The most important conclusion arrived at as the result of these trials was, to use the words of the report, " that without doubt the discharge of the gun will have no appreciable effect on the stability of the machine." Early experiments with large guns on aeroplanes were dangerous, and many weird and wonderful contraptions were devised to absorb the recoil. A few years ago the Westland " Westbury " twin-engined biplane was used as an experimental gun carrier. The Westland Aircraft Works, indeed, have produced a special mounting for heavy aircraft guns which is illustrated herewith.

AERIAL ARTILLERY. The Blackburn " Perth " flying boat is equipped with a 37-mm. gun firing shells weighing about 1½ lb. (FLIGHT *Photo.*)

Lately, the R.A.F. has adopted the 37-mm. Vickers-Armstrong automatic gun as a standard weapon, and some of these guns are installed in the Blackburn " Perth " flying boats of No. 216 (F.B.) Squadron, R.A.F. The gun is very accurate up to ranges of 4,500 yds. The mean [illegible] of recoil when fired from a [illegible] mounting on the ground is rou[illegible] 1,600 lb., but this is decreased [illegible] 200 lb. when fired from an aircra[illegible] flight. Continuous pressure on [illegible] trigger fires all the rounds in [illegible] magazine, but if the gunner wish[illegible] to fire single shots, he quickly releases the trigger after each round has been fired. Two types of ammunition are used, one a high-explos[illegible] shell fitted with a sensitive fuse [illegible] shell-destroying tracer, and the o[illegible] an armour-piercing projectile. B[illegible] shells weigh 1.8 lb.



Development of Bombing

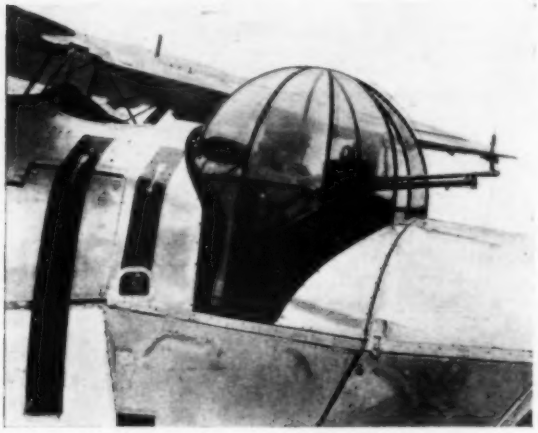
In the early days of the war, small improvised bombs, as great a danger, almost, to the crew of the aircraft which carried them as to the enemy, were dropped from aeroplanes. These were often supplemented by " flechettes " or " pencil darts," small steel rods, pointed at one end and " feathered " at the other, which were released in shower upon enemy personnel and horse line. Although deadly enough if they hit a man (there is a case on record of one piercing the steel helmet of a soldier, passing through his body and the body of his horse, and burying itself deep in the ground), they soon became regarded as next to useless. Grenades were dropped from aero-

HEAVY ARMAMENT. The Vickers Armstrong 37-mm. quick-firing gun on a Westland mounting.

planes at the Battle of Mons and something of a craze for incendiary bombs developed. It was not until November, 1914, when three Avros flew 250 miles over enemy territory and bombed the Zeppelin sheds at Friedrichshafen, that it became apparent that bombing from the air would have a widespread effect on the strategy of the war.

It was not so much the development of the bomb as the design of suitable sights and release gear that kept our armament experts busy. Early bombs were heavy, irritating contrivances, and "duds" and specimens which insisted on exploding before they reached their objective were common. However, reasonable accuracy was obtained in dropping them from low-flying machines, but when these were driven to higher altitudes by fire from the ground, effective results were far more difficult to obtain. Data on the trajectory of bombs and instruments for calculating the most advantageous position for the aircraft in relation to the target were not quickly forthcoming.

The Air Department of the Admiralty did much useful work in studying problems connected with the carriage, sighting and release of bombs. Experiments were made to determine the effect on an aircraft which the release of a



"PIECE FOR POLLY." The "piece," in this case, being a Lewis gun in the "parrot-cage," or revolving turret, on the Bristol 120. (FLIGHT *Photo.*)

heavy bomb would have, and at what height the machine should fly to keep clear of the explosion. It was discovered that a machine flying at 350 ft. could safely drop a bomb containing 40 lb. of high explosive. Soon it became apparent that the height and speed of the machine from which a bomb was dropped, the direction and velocity of the wind and the atmospheric conditions played all manner of tricks with a bomb. The methods of carrying bombs on aircraft were varied, but by the time that bombing became a really important factor in the conduct of the war standard practice was to attach them horizontally to racks beneath the wings and fuselage of an aeroplane. In the larger twin-engined types it was sometimes possible to secure them in the fuselage in a vertical or horizontal position, where they offered no resistance. Often, in the early days, single-seaters were used as bombers. A crew of two, a load of bombs and other military equipment would have been a heavy burden for a machine which, most likely, would be fitted with an engine of less than 200 h.p. Two-seaters were mainly used for day bombing work, the observer usually sighting and releasing the

EFFICIENT DISTRIBUTION OF ARMAMENT. On the Handley Page "Heyford" Night Bomber one gun is carried in the nose and two midway between the wings and tail. Of these, one is mounted in the "dustbin" seen extended.

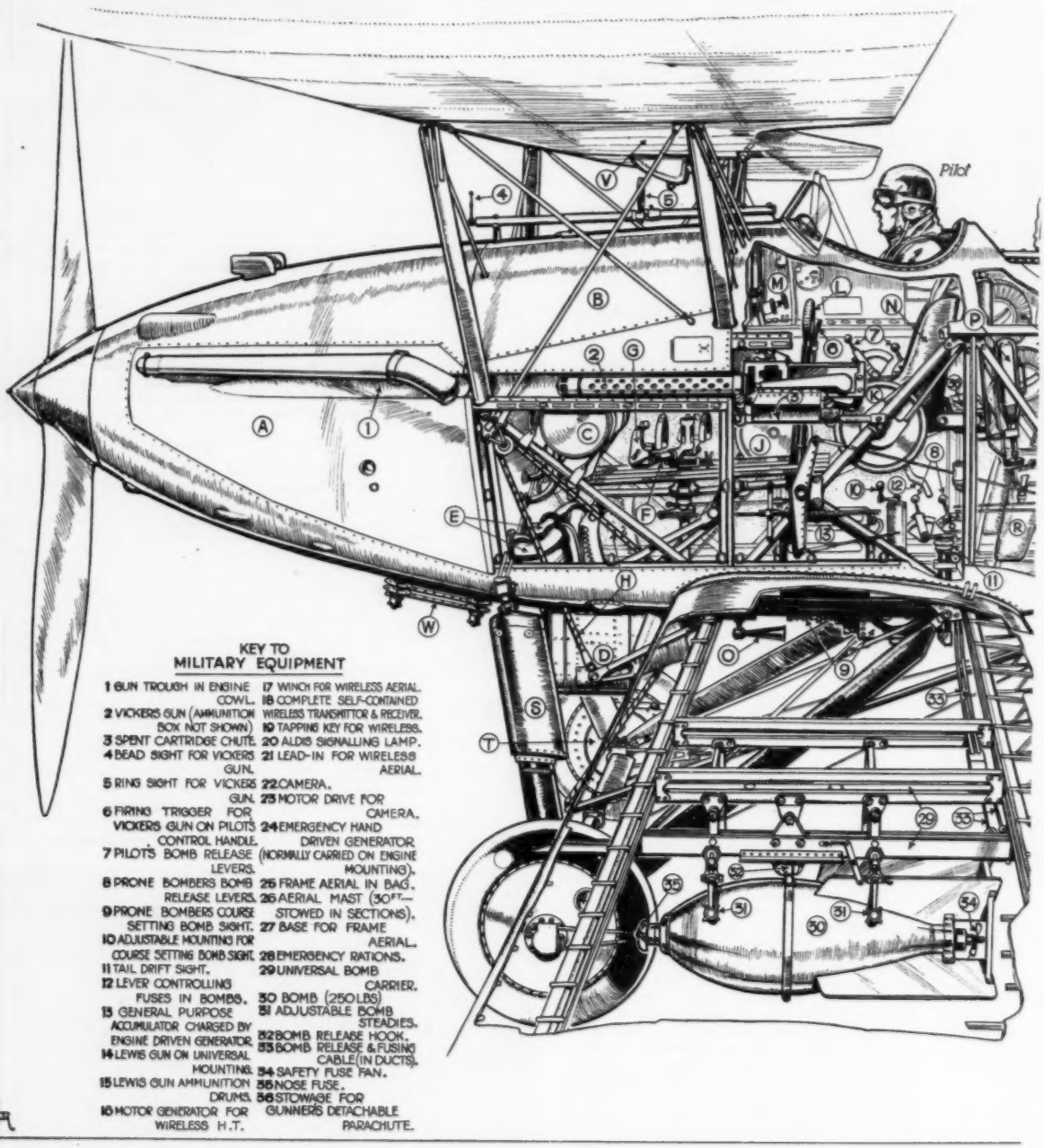
bombs, although the controls of the release cables could be duplicated. In the large twin-engined machines, the forerunners of our modern long-range night bombers, which, by 1918, were lifting about 2,000 lb. of bombs, it was possible to put the bomb aimer with his sight in the nose of the fuselage, where he had an almost unobstructed view.

Bombs

To-day, the variety of types of bombs is quite amazing, for besides the high-explosive kind for the demolition of buildings and for employment against submarines, there are the H.E. armour-piercing types, small fragmentation bombs, incendiary, smoke-producing and practice varieties. The two former types use, in most cases, mechanical means for delivering a blow on the cap of a cartridge head to the detonator, igniting the explosive. There are nose and tail fuses of the instantaneous or selective delay-action type. Over twenty different types of bombs are supplied to the R.A.F. Even single-seater fighters, excepting, of course, specialised intercepters, are equipped to carry four 20-lb. fragmentation bombs—most effective weapons for use against personnel and such objects as machine-gun positions. The bomb load of a normal single-engined day or general purpose machine might consist of two 230-lb. or two 250-lb. bombs, four 112-lb. and four 20-lb., or sixteen 20-lb. bombs. In some cases a single 500-lb. bomb might be carried. This load is carried in racks beneath the wings and fuselage where, unfortunately, the racks and bombs offer considerable resistance and spoil the performance of the aircraft. The bomb aimer often occupies a prone position on the floor of the fuselage. A typical loading for

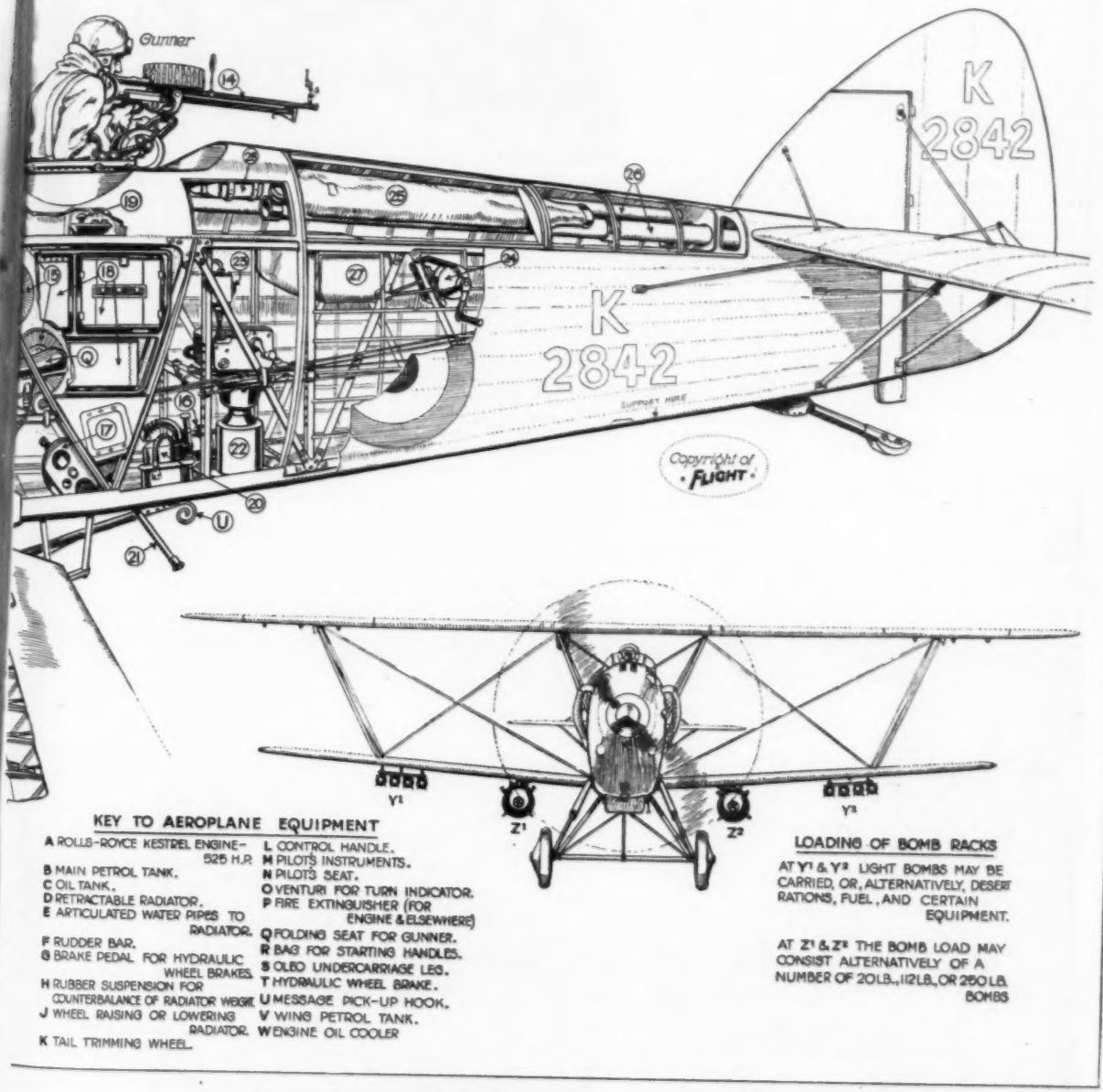
FOR HIGH-SPEED GUNNERY. Firing vertically downward with a Lewis gun on a Fairey "High-Speed" mounting.

A MODERN "G. P." TYPE:


Pilot
KEY TO MILITARY EQUIPMENT
1 GUN TROUGH IN ENGINE COWL.
2 VICKERS GUN (AMMUNITION BOX NOT SHOWN)
3 SPENT CARTRIDGE CHUTE.
4 BEAD SIGHT FOR VICKERS GUN.
5 RING SIGHT FOR VICKERS GUN.
6 FIRING TRIGGER FOR VICKERS GUN ON PILOT'S CONTROL HANDLE.
7 PILOT'S BOMB RELEASE LEVERS.
8 PRONE BOMBERS BOMB RELEASE LEVERS.
9 PRONE BOMBERS COURSE SETTING BOMB SIGHT.
10 ADJUSTABLE MOUNTING FOR COURSE SETTING BOMB SIGHT.
11 TAIL DRIFT SIGHT.
12 LEVER CONTROLLING FUSES IN BOMBS.
13 GENERAL PURPOSE ACCUMULATOR CHARGED BY ENGINE DRIVEN GENERATOR.
14 LEWIS GUN ON UNIVERSAL MOUNTING.
15 LEWIS GUN AMMUNITION DRUMS.
16 MOTOR GENERATOR FOR WIRELESS H.T.
17 WINCH FOR WIRELESS AERIAL.
18 COMPLETE SELF-CONTAINED WIRELESS TRANSMITTOR & RECEIVER.
19 TAPPING KEY FOR WIRELESS.
20 ALDIS SIGNALLING LAMP.
21 LEAD-IN FOR WIRELESS AERIAL.
22 CAMERA.
23 MOTOR DRIVE FOR CAMERA.
24 EMERGENCY HAND DRIVEN GENERATOR (NORMALLY CARRIED ON ENGINE MOUNTING).
25 FRAME AERIAL IN BAG.
26 AERIAL MAST (30FT.— STOWED IN SECTIONS).
27 BASE FOR FRAME AERIAL.
28 EMERGENCY RATIONS.
29 UNIVERSAL BOMB CARRIER.
30 BOMB (250 LBS)
31 ADJUSTABLE BOMB STEADIES.
32 BOMB RELEASE HOOK.
33 BOMB RELEASE & FUSING CABLE (IN DUCTS).
34 SAFETY FUSE PAN.
35 NOSE FUSE.
36 STOWAGE FOR GUNNER'S DETACHABLE PARACHUTE.
MAX MILLAR

"Hardy" is indeed an appropriate name for the aeroplane illustrated above, stripped to show the distribution of its complex equipment. It has lately been adopted by the R.A.F. as a General Purpose machine for work in certain overseas Commands. This exclusive drawing by Max Millar conveys in a graphic manner the finest indication of the layout of a military aircraft which has passed into the hands of the public, showing as it does the arrangement of

THE HAWKER "HARDY"



KEY TO AEROPLANE EQUIPMENT

A ROLLS-ROYCE KESTREL ENGINE—525 H.P.
B MAIN PETROL TANK.
C OIL TANK.
D RETRACTABLE RADIATOR.
E ARTICULATED WATER PIPES TO RADIATOR.
F RUDDER BAR.
G BRAKE PEDAL FOR HYDRAULIC WHEEL BRAKES.
H RUBBER SUSPENSION FOR COUNTERBALANCE OF RADIATOR WEIGHT.
J WHEEL RAISING OR LOWERING RADIATOR.
K TAIL TRIMMING WHEEL.
L CONTROL HANDLE.
M PILOT'S INSTRUMENTS.
N PILOT'S SEAT.
O VENTURI FOR TURN INDICATOR.
P FIRE EXTINGUISHER (FOR ENGINE & ELSEWHERE)
Q FOLDING SEAT FOR GUNNER.
R BAG FOR STARTING HANDLES.
S OLEO UNDERCARRIAGE LEG.
T HYDRAULIC WHEEL BRAKE.
U MESSAGE PICK-UP HOOK.
V WING PETROL TANK.
W ENGINE OIL COOLER

LOADING OF BOMB RACKS

AT Y^1 & Y^2 LIGHT BOMBS MAY BE CARRIED, OR, ALTERNATIVELY, DESERT RATIONS, FUEL, AND CERTAIN EQUIPMENT.

AT Z^1 & Z^2 THE BOMB LOAD MAY CONSIST ALTERNATIVELY OF A NUMBER OF 20 LB., 112 LB., OR 250 LB. BOMBS

armament, desert equipment, etc., as well as a large amount of structural detail. Students of design will find interest in examining the equipment by the aid of the keys provided and the companion article dealing with "Armament." The "Hardy" is the seventh variation of the Hawker "Hart" to go into service in the R.A.F., which lends weight to the opinion that this latter machine is one of the most successful types in its class yet produced

a night bomber would be two 520-lb. or 550-lb. bombs or eight 112-pounders. In a multi-engined bomber the bomb aimer usually occupies a position in the nose of the fuselage provided with a window, course-setting bomb sight, release controls and fusing levers. Often the release controls are duplicated and a set provided in the pilot's cockpit. The sight is an extremely delicate instrument which allows for the speed of the aircraft, wind speed, altitude, and even the speed of the target. A device indicates even the smallest deviation of the aircraft from its course. If the machine is a modern type it may be provided with electrical release gear, perhaps of the Handley Page type, which is replacing many of the old mechanical patterns. Aircraft bombs may be released singly or in any combination, or, if need be, the whole bomb load may be jettisoned. Fusing is also electrically controlled.

A number of safety arrangements are provided in a machine loaded with bombs. One device prevents the bomb functioning until it reaches a certain distance from the aircraft. If a forced landing is imminent the bombs can be dropped "safe," and in the event of a crash another arrangement would prevent the bombs from exploding.

Modern course-setting sights and super-efficient release gear have made possible quite incredible accuracy in high-altitude bombing. One form of attack with bombs which is being tried experimentally in the R.A.F. is "dive bombing," in which day bombers loaded with about 500 lb. of bombs release their load at the bottom of a very steep power dive. This method embodies similar principles to those of fixed gunnery—the whole machine is aimed at the target. It is particularly efficient when employed against such targets as warships. When a single-seater fighter is attacking a ground object with fragmentation bombs, no sights are used, the bombs being released from a low altitude at the judgment of the pilot.

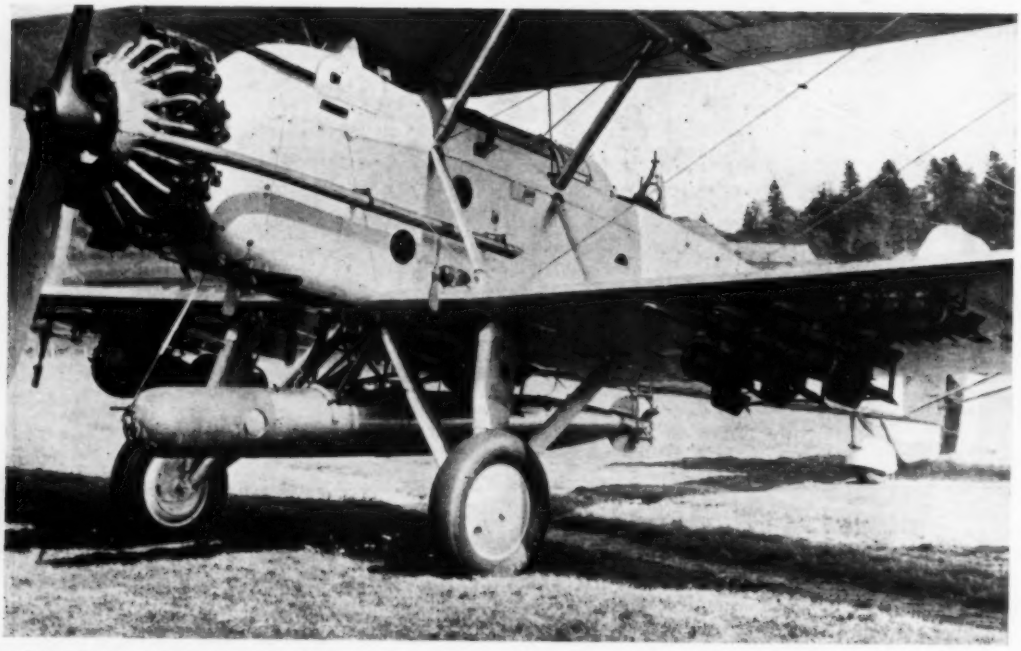
Torpedoes

All torpedo aircraft used in the R.A.F. are single-engined biplanes with "split" undercarriage, which allows for the carriage of the torpedo. Flying boats have been used experimentally as torpedo machines, carrying the weapons below their wings. Being a large machine, however, the flying boat presents an excellent target to gun fire when flying low to deliver a torpedo attack.

Modern torpedoes are developments of naval types strengthened to withstand the shock of impact on the water. They carry more explosive in relation to their weight than those employed in naval vessels, and travel at a higher speed. A recent pattern of Whitehead torpedo, for example, weighs 1,700 lb. and contains 400 lb. of explosive, the speed at 2,000 yd. range is 42 knots. In a typical torpedo bomber an 18-in. torpedo is carried in a steel tubular cradle below the centre line of the fuselage. It is held in its crutches by a pair of slinging cables at the ends of which is a cartridge-fired release gear. The torpedo may be released from either the pilot's cockpit or from the prone bomber's position. Adjustments for running depth may be made by the pilot and a torpedo heating device is provided.

An attack by torpedo-carrying aircraft is thrilling and dangerous business. The machine must dive from about 4,500 ft. to 15 ft. in about seven seconds, when the pilot flattens out, steadies the aircraft and takes aim. If released at too great a height the torpedo will break on hitting the water. It is all a delicate business and to forecast the effect of the torpedo in any future war would be foolish.

"BOMBING UP." Fitting a heavy bomb to a rack beneath the wing of a Vickers "Virginia" night bomber. (FLIGHT *Photo.*)



"MILITARY LOAD"—AND MORE. An 18-in. torpedo and an assortment of bombs on a Vickers "Vildebeest" torpedo bomber. Bombs and torpedo are alternative loadings. It is not possible to carry both at the same time.

FROM THE CLUBS

Events and Activity at the Clubs and Schools

CAMBRIDGE
Bad weather hampered the flying last week at Marshall's School, but 38 hours were put in, and three air-taxi trips made—one to Dublin and back. Mr. Lancaster made his first solo flight.

MIDLAND
During the week the Chief Instructor, Mr. W. H. Sutcliffe, flew with Mr. White to Le Mans, and two members carried out their licence tests. 32 hr. 45 min., in all, were flown.

CARDIFF
During the past fortnight 47 hr. 10 min. dual and solo have been flown at the Cardiff Club, with one first solo, by Mr. R. J. Horton, and "A" licence tests by Mr. W. N. Law. Lord Tredegar flew to London twice with the new "Leopard."

NORTH STAFFORDSHIRE
The North Staffordshire Aero Club, which has been operating from the Stoke-on-Trent aerodrome at Meir, has recently taken delivery of a Miles "Hawk," Colonial model, with wheel brakes, and are at present negotiating for the purchase of a "Moth."

BENGAL
During the month of May the Bengal Flying Club flew totals of 65 hr. 5 min. dual and 109 hr. 25 min. solo, with two new licences and one first solo. Among the new pupils are the wife and daughter of Dr. S. K. Ganguhy, and they should be greatly admired for their enterprise. Mr. R. D. M. Pattisson made a long cross-country flight.

HANWORTH
Owing to the extremely high winds, instructional flying was only possible on five days last week, but 43½ hours were flown. Mr. L. Meades made a first solo, and both Mr. Peach, who is a member of the Insurance Flying Club, and Capt. Crabbe, who owns a British Klemm, completed their licence tests.

HATFIELD
Flying at the London Aeroplane Club last week was rather curtailed by the high winds, the total being 65 hr. 20 min., but three members, Robinson, Womboro and Davis, made their first solo flights, and two others completed their licence tests.

P/O. Ross-Kirkman, of the R.A.F. Flying Club, flew to France for a few days.

RANGOON
May was the first full month of the new flying school, and a total of 74 hr. 30 min. was covered on the one "Gipsy Moth." The School has now seven soloists, and the distinction of being the first *ab initio* to go solo in Burma falls to Mr. T. E. Isaacs, who went off after 10 hours' instruction—a very good effort when the many difficulties of Mingaladon aerodrome are considered.

NORFOLK AND NORWICH
The Boulton & Paul scholarship winners, Messrs. D. G. Riches and H. C. Harrison, went solo within 20 minutes of each other last week. Another event was the arrival of the new Miles "Hawk" three-seater from Reading. The Club's policy of reducing flying rates would seem to be justified in the number of new pupils. A height-guessing competition has been arranged for the non-pilot members. Entrants will be taken up by the instructor, who will climb the machine until it reaches the passenger's estimation of 2,000 ft., and a sealed barograph record will indicate the winner.

ELY
The newly-formed Ely Aero Club will hold its opening garden party and display on Saturday, July 7, at 3 p.m. The secretary's address is 6, West End, Ely, Cambridge.

LINCOLNSHIRE
Eleven machines took part in a successful Dawn Patrol to Waltham on Sunday, June 17. Dr. Muir, of Hull, flew over to undertake an urgent operation, and Mr. L. Harris, from Croydon, to conduct a law case.

BRISTOL and WESSEX
On Tuesday of last week Mr. A. H. Downes-Shaw resigned from the chairmanship of the Club, a position which he has held since its formation in 1927. He will, however, continue to give the benefit of his experience on the Board of Directors. The new Chairman is Mr. R. Ashley Hall, who, like his predecessor, is a member of the Bristol City Council.

The winners of the *Evening World* flying scholarships were:—Messrs. C. A. Davis, R. D. Young and E. P. Mortimer.

READING
During the past month 262 hours have been flown at the Phillips & Powis School of Flying, and the new "Hawk" is constantly in the air. A second machine of this type will soon be in use. Miss Joan Parsons has completed a hundred hours towards her "B" licence, and Miss Fontes has been taking maintenance instruction. Notable visitors included H.R.H. Prince George, who arrived driving his own Bentley and departed in the Prince of Wales' "Dragon," H.R.H. Princess Arthur of Connaught, piloted by Mr. Mollison, Sir Johnston Forbes Robertson, Lady Maud Carnegie, and Capt. and Mrs. Tony Spooner.

CINQUE PORTS
The 1st and 2nd of September have been confirmed as the dates for the Club's International Meeting, and the preliminary details are well in hand. The date coincides with the visit of the Australian cricket team to Folkestone, and a liaison between the two fixtures is being arranged.

On the 27th and 30th of June the Club will have a machine on view at the Kent County Fair at Moat Park, which is to be visited by H.R.H. Prince of Wales, while night flying will take place as part of the evening's entertainment. On Saturday, June 30, too, the Club is assisting in the celebrations at Dover in honour of the Lord Warden of the Cinque Ports, by giving the ever-interesting display of bombing a speed-boat with flour bags.

BROOKLANDS
Capt. Duncan Davis has once again been assisting the Surrey Police, not by catching motor bandits, but by controlling the Ascot traffic from the air. With an Inspector, who had a number of specially prepared maps of the Ascot-Staines Road, he flew each day over the district and his passenger, on seeing any sign of a traffic block, marked a cross on the map at that point and dropped it in a mail bag at the nearest vantage point, where a mobile policeman was stationed, who proceeded to the spot to handle matters in the usual way. The experiment was highly successful. Capt. Davis also assisted the B.R.D.C. in connection with the British Empire Trophy Race by flying over the course during practice in order to ascertain whether the artificial turns were arranged in a safe manner.

In spite of the weather, more than 70 hours were flown during the week, and Mr. A'Bear made a first solo.

Private Flying

COMMENCING with our next issue the section dealing with Private Flying and club matters will be extended.

A special feature will be a weekly contribution from the pen of Lord Sempill, A.F.C., F.R.Ae.S., and all subjects of interest to the flying club member and the private pilot and aircraft owner will be included.

AT WOODFORD

The Lancashire Aero Club's Annual Display

THE Lancashire Aero Club is accustomed to "playing to packed houses." Woodford, Liverpool, and Blackpool are used to crowds running into five figures, and Saturday's meeting was no exception to the rule.

Notwithstanding rain in the morning and a cold north-easterly wind in the afternoon, a crowd estimated at 30,000 people witnessed a flying display which was made memorable by the co-operation both of the Royal Air Force and of Sir Alan Cobham's Air Pageant. From 2.30 p.m. to 5.30 p.m., and again from 6.30 p.m. to dusk, the programme proceeded without a break, and in spite of bumpy weather conditions the standard of flying was exceptionally high.

Perhaps the outstanding feature of a full day was the excellent flight aerobatics of No. 19 (Fighter) Squadron, R.A.F., who obtained the utmost from their Bristol "Bulldogs."

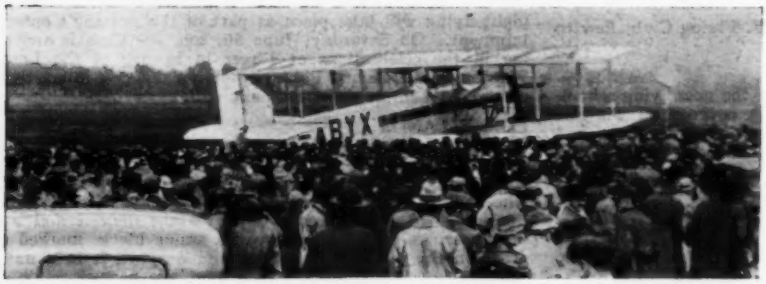
But Mr. Tyson, too, on the "Tiger Moth," was in brilliant form, whether he was "looping the hoop," picking up a handkerchief with his wing tip, or making an inverted dive to "ground level" followed by a zoom when still in an inverted position. He is one of the most brilliant exhibition pilots in the country, but some of his tricks might, with advantage, be performed a little farther from the public enclosures. "Jock" Mackay was equally emotioning on the "Mongoose" Avro, a machine which appears to be capable of standing up to anything that the pilot can do with it.

Mr. Marsh gave one of his impressive displays on the Autogiro, though on landing he apologised for putting up a poor show and explained that his throttle control had broken at the moment of take-off. No one watching his good work would have suspected this. Earlier during the day Señor de la Cierva himself had been testing the first production model of the C.30 Autogiro delivered by A. V. Roe & Co., Ltd., and this machine is to be acquired by the Lancashire Aero Club.

The cup for the inter-club relay race, presented by A. V. Roe & Co., was won by the Northamptonshire Club team (Messrs. Rose, Linnell, and Whittome) on their "Gipsy I Moth," the final lying between this club and the "home team." The former were lucky in drawing the inside berth, which gave them an advantage of about 300 yards on each of the three laps of the three-mile course, but this fact was balanced by the superior speed of the Lancashire "Cadet." At the end of the first lap Lancashire held a lead of about 200 yards, but on the second lap this was cut down to about 100 yards, the Northamptonshire pilot flying the better course. A misunderstanding between the second and third pilots of the Lancashire team on the change-over sent Northamptonshire away on the third with a lead of nearly 300 yards, and although the gap was narrowed before the finish the superior team work of the Northamptonshire Club gained them a well-deserved victory.

The general arrangements on the aerodrome itself and inside the enclosures were good, but considerable traffic congestion occurred on the roads leading to the aerodrome, particularly between the close of the afternoon display and the opening of the evening display. Woodford is one of the prettiest aerodromes in the country, but the only access for motor traffic is by a long and narrow approach road.

PRIME MOVERS: The "working party" at the Woodford display, grouped before the Lancashire Club's latest acquisition, a C.30 Autogiro.



PUBLIC INTEREST: Part of the crowd at the display, with Sir Alan Cobham's "air liner" in the background.

A VISIT TO THE RHINE

A GATHERING of private aeroplane owners, consisting of Germans (the hosts) and Englishmen (the guests), will take place shortly at Bonn. The visitors will start from Heston at 8 a.m. on July 7. Refuelling *en route* at Brussels, they will be received by Oberburgermeister Rickert and representatives of the German Airsport Association. The day will consist of sight-seeing by motor in Bonn and culminating in a "Rhenish Evening." On the following day there will be a visit to Beethoven's birthplace and the largest German wine cellar. The return journey may be made on the Sunday evening or the Monday morning.

S.M.A.E. "FLIGHT" CUP COMPETITION

THE Society of Model Aeronautical Engineers competition for the Cup presented by FLIGHT was held at Blackheath on June 10. This competition is for steering, in which the models (fuselage type) have to fly over a 200-yd. course and endeavour to pass through marked positions, similar to a large target. Points are awarded as follows:—Five for a "bull," three for an "inner," and one for an "outer." The result of the contest was as follows:—1st, E. G. Chasteneuf (Blackheath M.F.C.), 10 points; 2nd, E. F. H. Cosh (Blackheath M.F.C.), 6 points; 3rd, W. Blackman (B.M.F.C.), W. L. Henry (T.M.A.C.), and T. H. Ivis (S.M.A.E.), 5 points each.

THE KING'S CUP RACE

Forty-three Machines Entered

FIVE late entries of the King's Cup air race should be added to the list published in FLIGHT of May 31. These five are: A "Moth" with "Gipsy Major," entered by T. A. K. Aga, who is also to pilot it in the race; a "Tiger Moth" ("Gipsy Major"), entered by Capt. de Havilland, to be piloted by his youngest son, Peter de Havilland; a "Monospar," S.T.4 (two Pobjoy "R's"), entered and to be flown by A. C. M. Jackaman; a Percival "Gull" (Napier "Javelin"), entered by Sir J. Kirwan, and to be piloted by I. D. Kirwan; and a Blackburn B2 "Trainer," entered by Mrs. Wise Parker, to be piloted by Flt. Lt. H. M. David.

Details concerning the manner in which this year's King's Cup Race will be flown are now also to hand from the Royal Aero Club. The race, as recorded in FLIGHT of May 17, will be flown over four different courses and on two consecutive days, Friday, July 13, and Saturday, July 14. The first and second courses will be flown on the first day and the semi-final and the final on the last day.

Round 1 will consist of six heats of the course, Hatfield-Upper Heyford-Whitchurch (Bristol)-Old Sarum-Hatfield. The first four in each heat will pass into Round 2.

The course for Round 2 is Hatfield-Waddington (Lincoln)-Upper Heyford-Hatfield. It will consist of four heats, and the first four in each heat will pass into the semi-final round, to be flown next day.

On Saturday, July 14, the racing will commence with two heats of the semi-final course, which is Hatfield-North Weald-Henlow-Hatfield. The course has to be covered three times. There will be eight competitors in each heat, and the first five in each heat will compete in the final.

A good feature of this year's race is that the final consists of six circuits over a short course, Hatfield—Watton-at-Stone—Hoo House—Hatfield. This will give the public an excellent chance of seeing how the ten machines left in the final are gaining and losing ground as they go round the turning point at Hatfield.

On Friday, July 13, racing is expected to begin early, probably round about 8 a.m., and will continue throughout the day. On Saturday, July 14, on the other hand, racing will not begin until 1.30 p.m., when the first man starts in the semi-final.

HENLYS' HESTON RALLY

Aerobatics, Demonstrations, and Car Events at Henlys' Rally and Gymkhana—the Third to be held at Heston

THE shape of Heston Airport must have caused any visiting pilots to rub their eyes as they made a preliminary circuit last Saturday. Cars and more cars—five thousand or so—people and more people, blackened a corner of the aerodrome while Henly's held their annual rally, during which first-class flying events were interspersed with motoring competitions, generally of the less serious variety.

Two of the flying events must have been of outstanding interest to the general motoring public—Mr. R. A. C. Brie's masterly demonstration of the C.30 Autogiro and Mr. S. A. Thorn's equally impressive exhibition of inverted flying with an Avro "Tutor." With the aid of a fairly strong breeze, the Autogiro was made to perform equally well in vertical and horizontal planes, while an efficient announcer explained what it would do. The crowd was definitely impressed by its speed range and by the manner in which it could be dropped without run directly beside the enclosure, and Brie was very busy most of the afternoon giving flights to interested people.

Mr. S. A. Thorn, who is, of course, one of Henly's staff, appeared to be just as happy with his "Tutor" either way up, and did several banked circuits in an inverted position before climbing up to do a "double bunt." Once or twice his engine "cut" momentarily after a petrol feed change-over, but otherwise all was at it should be.

The strong breeze did not help Mr. Tranum's drops with an Irvin parachute, but he placed his "landing" nicely in the centre of the aerodrome on each occasion, his first being delayed long enough to give the Roman Holiday effect.

It always seems that for the right result a first flight should be made in something really commodious and comfortable, and at Heston there was the new Short "Scylla" and the B.A.N.C.O. Ford "Tri-Motor" for the more earnest searchers after air wisdom, as well as the usual open cockpit machine.

A "Concours d'Elegance" and a number of amusing events for the more motor-minded were interspersed, and the prizes were distributed by the Countess of Drogheda.

YELLOW TRAINING MACHINES

IT has been decided that all aeroplanes used in the Royal Air Force for flying training shall be painted yellow instead of the usual silvery-white. In nearly all conditions of visibility yellow catches the eye more quickly than white does, and so this change should do something to minimise the risk of collisions. In addition, it is a useful move to make all training machines conspicuous, so that other pilots will readily recognise them, and keep well out of the way of novices who are fully occupied in attending to their own affairs.

THE HIGHER EDUCATION TEST

THE Chartered Institute of Secretaries has agreed that a candidate in possession of the R.A.F. educational certificate will be exempt from the preliminary examination of the institute. Applications for such exemption and for particulars of the examinations of the institute are to be made direct to the Secretary at 6, London, Wall, London, E.C.2.

ABERDEEN ACTIVITIES

PROGRESS at Aberdeen is rapid. Already the clubhouse and hangar are up and another hangar for Aberdeen Airways will be completed in about two weeks' time; when finished it will hold six "Dragons." A programme of services has been arranged which will cater for the traffic between Aberdeen and Edinburgh, Glasgow, Inverness, the Orkney Islands, the Shetlands, and later, to the Isle of Man and Belfast. Very shortly the aircraft in service on this new aerodrome will include two "Dragons," a Short "Scion," a "Fox Moth," a "Puss Moth," two Klemms and a "Bluebird." The work of preparing this site has been very considerable, and when it is finished there will be clear runways in all directions of 750 yards. Thus Aberdeen will have a first-class commercial aerodrome for which it has to thank the private enterprise and initiative of Mr. E. L. Gandar Dower.

A GLIDING FATALITY

As the result of an accident, which occurred at Dunstable, the gliding ground of the London Gliding Club, on Sunday, June 17, Mr. Louis A. Desoutter, the youngest of the four Desoutter brothers, died at Finchley last Saturday. Mr. Desoutter was the instructor for the day and was making the first test flight of one of the Club's "Dagling" training gliders. When less than ten feet above the ground one of the flying wires broke inside the ferrule and caused the fatal crash. This form of accident is not known to have occurred previously, although the type of glider involved has been used extensively both in this country and in Germany for over twelve years. Mr. Desoutter was a fully qualified pilot of gliders and aeroplanes. He leaves a wife and three children, to whom we offer our sincerest sympathy in their distress.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

Pirate Hunting Up to Date

Machines from H.M. Aircraft Carrier *Eagle* played an important part in the release of the British subjects who were captured by pirates at the mouth of the Yellow River, and in the rounding-up of the pirates themselves.

More Landing Grounds

Recent additions to the A.A. Register of Landing Grounds are grounds at Dotterel, in Yorkshire, which is roughly 4½ miles south of Filey; at Dunsley, about two miles north-west of Whitby, also in Yorkshire; at Lossiemouth, the home of our Prime Minister, in Morayshire; at Combermere, which is roughly north-east of Whitchurch, Salop; at Rhos Ucha, near Wrexham, and at Stratford-on-Avon, in Warwickshire. The grounds at Banbury, Bourne End and Yarmouth have temporarily been withdrawn from the register.

A "Puss Moth" in Sweden

A well-known Swedish civilian aviator, Mr. Kurt Björkvall, recently returned from Northern Sweden, where with his "Puss Moth" he has spent the winter, having his headquarters at the famous Swedish ski centre of Are. His aeroplane was in great demand to take skiers up to the mount Areskutan, either as a starting place for long ski excursions or just to make the swift descent down to the valley. The "Puss Moth" also had other uses. A Lapp. owner of large herds of reindeers, found it a great convenience to fly over the country and in a few minutes assure himself of the whereabouts of his beasts, a task which would have taken him several days if he had had to rely on his traditional skis.

DROPPING THE PILOT: Capt. A. B. H. Youell leaves the good ship *Scylla* via the new pilot's gangway.

New Portuguese Air Services

Air lines, it is reported, will presently be opened between Lisbon and both the Portuguese African Colonies and the South American Republics.

The American Air Increase

More than a hundred of the 1,184 aeroplanes, called for in the U.S. Navy's five-year programme, are to be built in the Navy Department's factory at Philadelphia, which is being rebuilt at a cost of £540,000.

Famous French Pilot Killed

M. André Salel, who has made several important long-distance flights, was killed last week while testing a new machine.

Twenty-five Years Ago

From FLIGHT *of June 26, 1909.*

"Winds seem to have no terrors for Mr. Latham and his *Antoinette IV*. Last Saturday he flew for about 34 minutes, and on the previous day he went up although there was a very high wind blowing. Mr. Latham had an exciting struggle with the elements, but he maintained his equilibrium, although in making one turn the wind caused him to make a wider sweep than he intended."

Fast Italian Flight

An average speed of 230 m.p.h. was maintained by Artigiani in a flight from Milan to Rome.

Round Germany Flight

This year the *Rundflug* was a purely national event in Germany, and more than a hundred light aeroplanes of different types have been taking part. The competitors were not single pilots but formations representing branches or clubs of the German Air Sport Federation, and the whole was a test of navigation and ground organisation. Unfortunately, two tragedies marred the event, one machine crashing in Pomerania and another near Bielefeld.

DEUTSCHLANDFLUG, 1934: Some of the machines in the German tour at Tempelhof. The new Feiseler monoplane can be seen in the foreground.

OLD AND NEW : The Fokker F.XX (three Wright "Cyclones") with retractable undercarriage, and the standard F.XII (three P. & W. "Wasps"), on the tarmac at Croydon. The cruising speed of the F.XX is 157 m.p.h.
(FLIGHT *Photo.*)

Pterodactyl Damaged

It seems that the *Pterodactyl* may not be seen at the Display, for it turned over in a high wind during a take-off at Farnborough. The pilot, Flt. Lt. G. H. Stainforth, was unhurt.

No Hope for the England-Australia Race

Owing to the playful movements of one or two little words, a sentence in the issue of June 7, unequivocally stated that Capt. W. L. Hope would fly a "Gipsy Moth" in the MacRobertson race. We are assured by Capt. Hope that such is not the case, and the offending line should have read: "This latter machine, piloted by Capt. W. L. Hope, won the King's Cup Race in 1928."

A West African Service?

An application has been received by the Southampton Corporation for facilities to operate a service to West Africa.

Swedish Commission to Visit England

Early in July a Swedish Royal Commission, headed by Mr. Nothin, the Governor of Stockholm, and Capt. Carl Florman, Managing Director of A.B. Aérotransport, will visit this country for the purpose of studying our commercial and civil aviation organisations. In addition to conferences with the Director of Civil Aviation, the Commission will inspect such airports and aerodromes as Croydon, Heston and Hatfield. The duration of the stay is likely to be from July 2 to July 4.

A French Rally

An Air Rally, organised by the Union of Civil Pilots in France, is to be held on July 14 and 15 at Auxerre-Bourges. Full particulars and entry forms, which must be sent in by July 9, can be obtained from the Royal Aero Club.

A Club Year Book

All the information for the amateur pilot, whether actual or prospective, is to be found in the "Flying Clubs and Schools Year Book," which has just been published by Simpkin Marshall, Ltd. In handy form, information of the equipment, charges and operation of all the clubs and schools is given, and the little book appears at a time when interest is definitely increasing. It is edited by Mr. W. H. E. Thomas, of Grand Buildings, W.C.2, and there is a foreword by Lord Sempill.

An Aeronautical Engagement

During the week-end an engagement of more than usual interest was announced. Miss Winifred Drinkwater, a pilot of Midland & Scottish Air Ferries, Ltd., is to marry Mr. Francis Short, a director of Short Bros., and son of the late Mr. Horace Short.

Mr. James Wedell Killed

With the death in a flying accident of Mr. James Wedell, America loses a pilot of considerable ability and a designer of note. He had built a number of racing machines and had entered a machine in the England-Australia race.

CZECHOSLOVAKIAN : The Aero 100, which has been designed for general purpose work, has a top speed of 162 m.p.h.

Diary of Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in this list :

June 29. R.A.F. Twelfth Annual Dinner.
June 30. Royal Air Force Display, Hendon.
July 2. S.B.A.C. Exhibition at Hendon.
July 3-9. 4th International Congress for Applied Mechanics, Cambridge.
July 8. French International 12-Hours Reliability Trial.
July 8. Competition for Model Aircraft, Great West Road Aerodrome.
July 13-14. King's Cup Race. Start and finish at Hatfield.
July 21. Round the Isle of Wight Air Race.
July 21-22. French Grand Prix
July 28. Bristol and Wessex Ae.C. Garden Party.
July 29. London-Sherburn Race (York County Aviation Club).
Aug. 11. London-Newcastle Race (Newcastle-on-Tyne Ae.C.).
Aug. 15. Air Tour of Italy.
Aug. 17-Sept. 6. Copenhagen Aero Show.
Aug. 18. Cotswold Aero Club Air Rally and Garden Party.
Aug. 25. Liverpool and District Ae.C. Garden Party, Speke Aerodrome.
Aug. 28-Sept. 16. International Touring Competition, Poland.
Sep. 1-2. Cinque Ports Flying Club International Rally, Lympne.
Sept. 8. Official Opening of Wallsall Aerodrome.
Oct. 6. London-Cardiff Air Race and Cardiff Ae.C. Air Pageant and Dance.
Oct. 7. Aviation Golf Meeting, Royal Porthcawl Golf Club, Porthcawl.
Oct. 20. England-Australia Race for MacRobertson Prize.
Nov. 16-Dec. 2. 14th International Aviation Exhibition, Grand Palais des Champs-Elysees, Paris

SCALED DOWN

Model Aeroplanes Fly at Warwick for the Wakefield Cup

A STEADY drizzle of rain was falling, and the clouds were very low at Warwick race-course last Sunday, June 24, but, quite undismayed, some 45 model aeroplane enthusiasts turned out with their machines before noon, at which time the eliminating trials were held to find a British team of six to represent this country in the international contest for the Wakefield Cup.

·WINNER RECEIVING THE CUP·

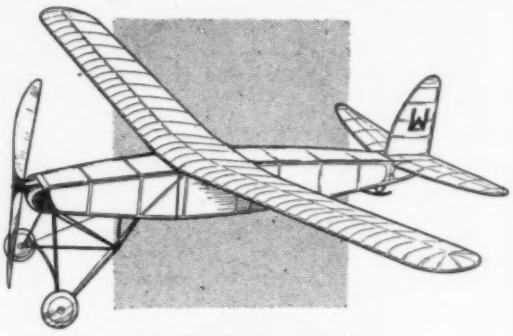
This handsome trophy, presented by Lord Wakefield for annual competition, is awarded for duration of flight by rubber-driven models which must be within certain specified dimensions, and weigh not less than 4 ounces. The winning machine last year made a flight of 321 seconds, and was built by Mr. J. W. Kenworthy, of Manchester.

The take-off has to be made under the machine's own power, and to this end a platform of boards had been placed on the grass, pointing into wind, which was rather patchy and troublesome. In spite of this some very good flights were made with plenty of incident, more amusing to the crowd of spectators than to the anxious owners of the machines. Quite an appropriate diversion was caused when Sir Alan Cobham's Air Circus roared out of the haze in perfect formation, led by the big Handley Page, on their way to Leamington.

At last a team of six was chosen, consisting of Messrs. Allman, Howse, Fillingham, Ives, White and Liggit; thereupon one and all retired to the refreshment tent to dry out models and wet the inner man—with hot drinks. A large crowd of spectators had gathered long before 4 p.m. to see the actual contest; two French competitors had arrived and were busy rigging their machines, one of these being notable in having a single surface wing. The American machines were being flown by proxy, and had been unpacked and assembled. They proved to be very well-finished specimens, all monoplanes—as were all the machines in the competition—two of them of parasol type.

The machines were then sent off one after another, some climbing and staying close to the starting point, others travelling almost out of sight, and yet others meeting an early fate in the crowd. The American machines flew beautifully, noticeable features being their extremely slow-speed airscrews, and beautiful landings due to their slow gliding properties. The French machines did not seem too happy, one of them having difficulty with the take-off.

The machine built by Mr. Howse, of Bristol, had a terrific initial climb after which it flattened out, and held its height to such good purposes that had its third and last flight not terminated abruptly, for some inexplicable reason, the result of the contest might have been quite different. Then the most promising American machine (W. Getsla) was unfortunately rendered *hors de combat*, due to its airscrew spindle pulling out, the sudden release of tension wrecking part of the fuselage. Its first flight was one of 116 seconds. Another American (F. Zaic) which flew very steadily was a parasol with a fuselage constructed entirely of Balsa wood.



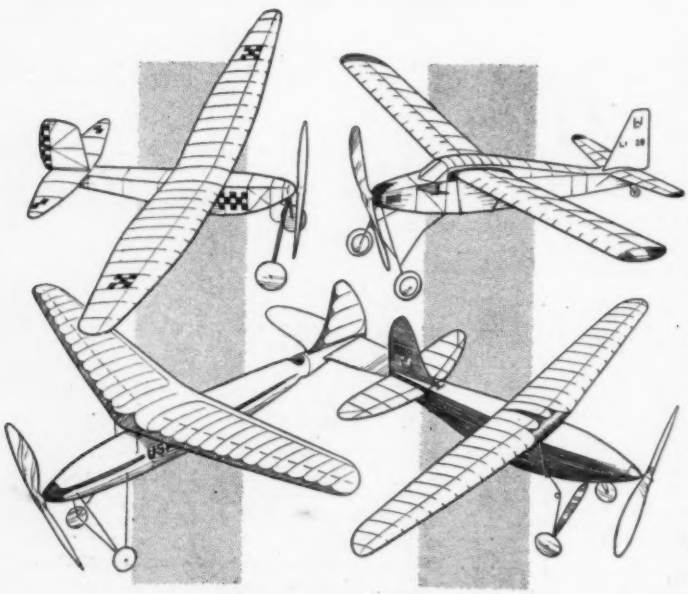
Allman's winning machine.

Mr. Allman's last flight, and one which gave him the Cup, was thrilling to watch. The machine took off and climbed rapidly, and eventually disappeared behind the race-course grandstands; it reappeared well over the neighbouring town, and once more was blotted out of sight by the Tote building. Then seemingly hours afterwards it suddenly shaved the corner of the Tote, returning at high speed, a great cheer going up from the crowd.

At the conclusion of the meeting the Cup was handed over to the winner by Dr. A. P. Thurston, Vice-President of the S.M.A.E. The lucky winner was Mr. J. B. Allman, of the Leamington and Warwick Club, with an average of three flights of 111.8 seconds. A worthy effort in view of the weather conditions, and the fact that his first flight was only one of 8.5 seconds, his best being 163 seconds. The weight of his machine was 5¼ ounces.

Second was Mr. Howse, of Bristol, whose average was 90.2, whilst third place was annexed by an American machine built by Frank Getsla, of the Bamberger Club, New York City, and flown for him by Flt. Lt. Bullock, with an average of 85.2 seconds.

J. P. F.



Shapes and Sizes at Warwick.

AT THE DISPLAY

Fighters which, ten minutes after leaving the ground, can reach a height of four miles, and at that altitude can race, out-climb, and out-manoeuvre any aeroplane in service in the world ; day bombers and army co-operation aircraft, faster, by far, than the majority of fighters in service three or four years ago ; night bombers capable of flying three miles high for hundreds of miles non-stop with over a ton of bombs ; flying boats, envied the world over for their performance and seaworthiness ; experimental machines, through the development of which British constructors maintain the foremost position in the markets of the world. These and a variety of other types will convene at Hendon next Saturday to thrill, amuse, and instruct a vast concourse.

Illustrated with FLIGHT photographs

FIGHTERS

WKER " FURY "

(Rolls-Royce " Kestrel " II S., 12-cyl. " Vee " water-cooled, 525 h.p.)

Known as an " intercepter fighter," the " Fury " was designed primarily for the interception and destruction of hostile bombing aircraft flying at high altitudes. For this work the machine has an exceptionally good rate of climb (in its standard form it can reach 20,000 ft. in about 9½ minutes) and can make a top speed of 214 m.p.h. In terminal velocity dives it may reach about 350 m.p.h. The machine is a shapely biplane of 3,310 lb. gross weight with heavily staggered wings 251 sq. ft. in area. The pilot, although sitting well back in the fuselage, has a good fighting view. He is armed with two Vickers guns for which 1,200 rounds of ammunition are provided. Some of the " Furies " in service are fitted with wireless equipment, although when the machine went into service this was not carried. The amazing speed range and controllability of the " Fury " has made possible a new technique of formation flying. Though possessing such an astonishing performance, the landing speed is surprisingly low. Brakes are fitted to reduce the landing run.

Hawker " Fury " (Rolls-Royce " Kestrel " II.S).

LLDOG IIA "

(" Jupiter " VII F.P., 9-cyl. air-cooled radial, 460 h.p.)

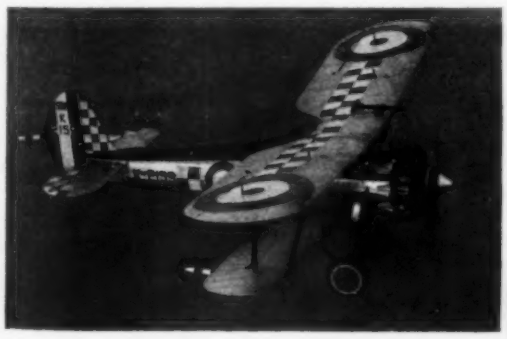
Adopted by the R.A.F. in 1929 as the standard day and night fighter, the " Bulldog," while retaining a fine performance, carries a very comprehensive military load, which includes two Vickers guns, night-flying equipment oxygen, and, if necessary, four 20-lb. bombs. These latter are intended for use during low-flying attacks, for " strafing " enemy personnel and such objects as machine-gun nests and tanks. The wing area is 305.6 sq. ft. and the gross weight 3,530 lb. When fitted with the fully supercharged " Jupiter " VII F.P., the " Bulldog " has a top speed of approximately 170 m.p.h. and at cruising speed can stay up on a patrol for nearly four hours. In its original form the " Bulldog," being a " clean " aircraft, was rather reluctant to stop after its wheels had touched the ground for a landing, but many of the " Bulldogs " now in service have been fitted with brakes. Another recent modification is a system of cockpit heating whereby air is collected in a heater muff on each exhaust pipe and fed into the cockpit through the bottom of the fuselage.

HAWKER " NIMROD "

(Rolls-Royce " Kestrel " II S., 12-cyl. " Vee " water-cooled, 525 h.p.)

Introduced into the Fleet Air Arm two or three years ago as a replacement for the Fairey " Flycatcher " (" Jaguar "), the " Nimrod " is a development of the " Fury," but is fitted with larger wings, 301 sq. ft. in area, has larger fuel tanks, deck flying gear, long exhaust pipes, etc. The gross weight is 3,560 lb. As with the " Osprey," stainless steel is largely used in some of the " Nimrods." The latest version of the " Nimrod " has swept back wings. Two Vickers guns are mounted in the top of the cowling and light bombs may be carried in racks beneath the lower planes.

A top speed of approximately 200 m.p.h. is attained, while the rate of climb, although lower than that of the " Fury," is highly creditable for a machine carrying the heavy equipment demanded in Fleet aircraft. Complete wireless transmitting and receiving apparatus is fitted. The structure of the aircraft is specially designed to withstand catapult launching, and a twin-float undercarriage may be fitted if desired, although this is not employed to any great extent in the Service.



Bristol " Bulldog " (" Jupiter VII " F.P.).

Hawker " Nimrod " (Rolls-Royce " Kestrel " II.S).

HAWKER "OSPREY"

(Rolls-Royce "Kestrel" II M.S., 12-cyl. "Vee" water-cooled, 525 h.p.)

This machine, a development of the "Hart," performs a relatively new class of work in the Fleet Air Arm and, fitted with either wheels or floats, may be used as a two-seater fighter or a reconnaissance machine. The wings, 346 sq. ft. in area, are designed to fold, and deck arresting gear is fitted. The gross weight is 4,230 lb.

Several cruisers carry "Ospreys" on their catapults, and use them for general reconnaissance work and for gunnery spotting. Stainless steel is largely employed in the construction of the "Osprey" as an anti-corrosion measure when the aircraft is carried at sea for long periods.

One may distinguish the "Osprey" from the "Hart" by the shape of the fin and rudder, which are larger and more rounded, and by the long exhaust pipes.

Hawker "Osprey" (Rolls-Royce "Kestrel" II M.S.).

DAY BOMBERS

HAWKER "HART"

(Rolls-Royce "Kestrel" I B., 12-cyl. "Vee" water-cooled, 525 h.p.)

Fastest of the day bombers used by the R.A.F., the "Hart" is a beautifully proportioned biplane with a top speed in the neighbourhood of 180 m.p.h. About 500 lb. of bombs are carried in racks beneath the wings and fuselage, and the pilot is armed with a fixed Vickers gun, while the observer uses a Lewis gun. The wing area of the "Hart" is 347 sq. ft. and the gross weight 4,620 lb.

During the past year or two the "Hart" has been used for experimental work with a view to perfecting a "dive bombing" technique. In the steep power dives necessitated by this work, the "Hart" reaches speeds of over 300 m.p.h. The machine possesses exceptional powers of manœuvre and a modified version known as the "Demon" is the standard two-seater fighter of the R.A.F. Another derivative type of the "Hart" which will not appear at the Display, is the "Hardy" General Purpose aircraft now being issued to certain squadrons in overseas commands.

Hawker "Hart" (Rolls-Royce "Kestrel" I B.).

WESTLAND "WALLACE"

(Bristol "Pegasus" I M. 3, 9-cyl. air-cooled radial, 555 h.p.)

This machine may be regarded as the successor to the well-known "Wapiti." In general layout both machines are similar, but the "Wallace" is fitted with a moderately supercharged "Pegasus" engine in place of the "Jupiter," a re-designed undercarriage, longer fuselage and an improved wing structure. The wing area is 488 sq. ft. and gross weight 5,750 lb. The "Wallace" will carry about 100 lb. more than the "Wapiti."

For a heavily-loaded two-bay biplane carrying all the equipment demanded in a general purpose aircraft, the performance is very creditable, the top speed being in the neighbourhood of 160 m.p.h. A modified "Wallace" was one of the machines used by the Houston-Everest Flight last year.

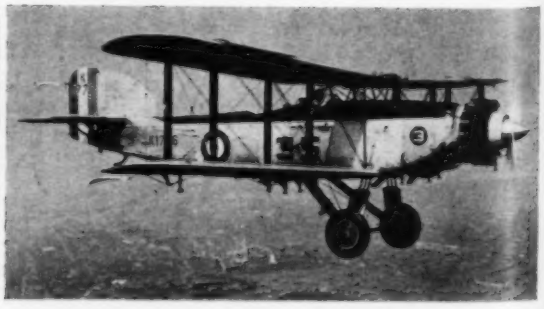
FAIREY "GORDO

(Siddeley "Panther" II A., 14-cyl. air-cooled radial, 525 h.p.)

Developed from the world-famous Fairey III.F, the "Gordon" is basically similar to this type, but is fitted with the Siddeley "Panther" air-cooled engine in place of the Napier "Lion." One other distinguishing feature is the mounting of the Vickers gun, which in the "Gordon" is placed outside the fuselage. The wing area is 445 sq. ft. and the gross weight 5,900 lb. For operation over sparsely-populated countries, the machine may be fitted with desert equipment, comprising a spare wheel, extra fuel tank, water rations and medical supplies. In emergency it may be used as an ambulance if some of the military equipment is removed.

About 500 lb. of bombs are carried and the pilot is armed with the usual Vickers gun, while the observer is provided with a Lewis gun on a Fairey "high-speed" mounting. A similar type to the "Gordon," the Fairey "Seal," is extensively used for reconnaissance work in the Fleet Air Arm.

Westland "Wallace" (Bristol "Pegasus" I M.3).



Fairey "Gordon" (Siddeley "Panther" II A.).

Handley Page "Heyford" (two "Kestrel" III.MS).

NIGHT BOMBERS

HANDLEY PAGE "HEYFORD"

(2 Rolls-Royce "Kestrel" III M.S., 12-cyl. "Vee" water-cooled, 525 h.p.)

This type is the latest long-range night bomber to go into service with the R.A.F. It is a striking aircraft in many respects. The manufacturers call it an "express" night bomber, not only because of its high speed in the air, but because of peculiar properties which make for rapid rearming and refuelling on the ground between raids. The fuselage, being carried beneath the top plane, allows very wide fields of fire for the three machine guns. One of these is carried in the nose of the fuselage and the other two between the main planes and the tail, one on top of the fuselage and the other in a turret beneath which may be rotated and retracted. This latter deadly contrivance is disrespectfully known in the Service as the "dust bin."

The two "Kestrel" engines are supercharged and give the "Heyford" a top speed of 143 m.p.h. at 13,000 ft. If desired, an automatic or "robot" pilot, affectionately known in the Service as "George," may be installed. The "Heyford," although a large heavily loaded aircraft, is highly manœuvrable and lands quite slowly, a great advantage for a machine which flies by night. The wing area is 1,470 ft.

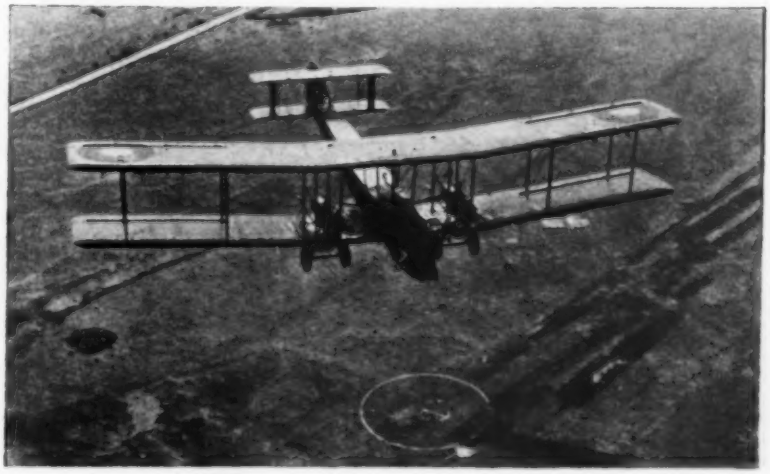
VICKERS "VIRGINIA"

(2 Napier "Lion" V, 12-cyl. water-cooled "broad arrow," 450 h.p.)

A well-tried night-bomber type, the "Virginia" is a very large aeroplane with a wing area of 2,184 sq. ft., capable of carrying a crew of four and about 3,000 lb. of bombs on the power of two Napier "Lion" engines of 450 h.p. each. The gross weight is 17,960 lb. Three Lewis guns on Scarff mountings are provided for defensive purposes, one of these being situated behind the tail.

The type is now due for replacement, for its performance does not suit modern requirements, the top speed being about 95 to 100 m.p.h. At economical cruising speed the machine can stay up for over 12 hours. The landing speed is exceptionally low. For long-distance flying an "automatic pilot" may be employed. A crew of four is normally carried.

The "Virginia" is a descendant of the "Vimy," which made the first direct Trans-atlantic flight in 1919.



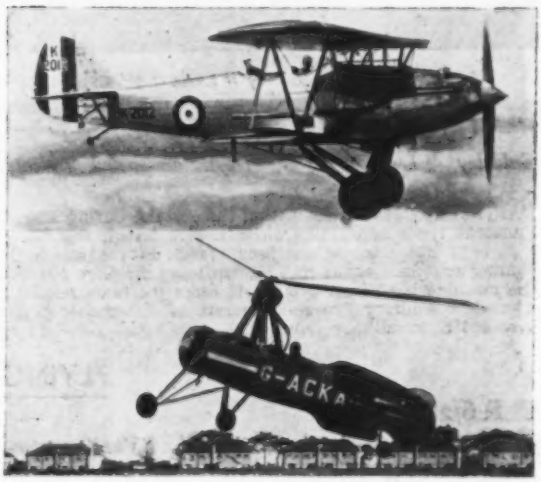
Vickers "Virginia" (two Napier "Lion" V).

ARMY CO-OPERATION

HAWKER "AUDAX"

(Rolls-Royce "Kestrel" I B, 12-cyl. "Vee" water-cooled, 525 h.p.)

Several Army Co-operation Squadrons have recently been equipped with this machine, which is yet another development of the ubiquitous "Hart." For army co-operation work it is fitted with wireless receiving and transmitting apparatus, a hook for picking up messages tied to string stretched between two posts, rifles or lances, night-flying equipment and long exhaust pipes.



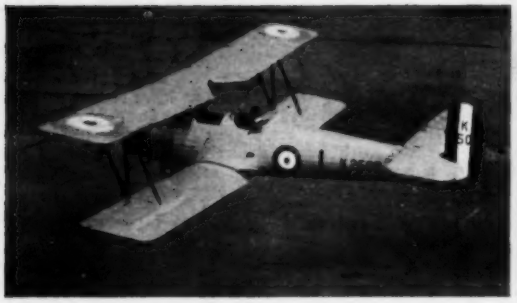
Hawker "Audax" (Rolls-Royce "Kestrel" IB) and Autogiro C.30 (7-cyl. Siddeley "Genet Major").

AUTOGIRO C. 30 P.

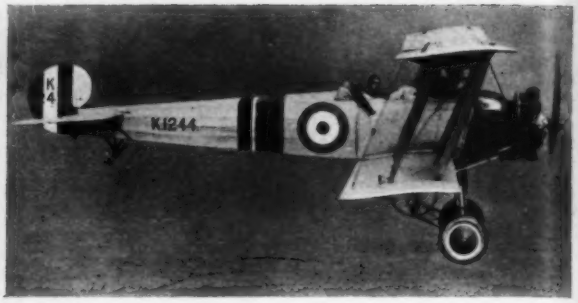
(Siddeley 7-cyl. "Civet" air-cooled radial, 140 h.p.)

This machine, which has hitherto been used mainly for civil flying, and is gaining in popularity, is at present being used experimentally for army co-operation work, and a number of aircraft of this type are being supplied to the Air Ministry. With its exceptionally slow flying qualities it should make an excellent machine for gunnery spotting and similar duties, although the rotor blades form a very vulnerable target to gun fire from the air and from the ground. For operation from aircraft carriers, the machine has much to recommend it.

TRAINING



Avro " Tutor " (Siddeley " Lynx " IV C).



Avro 504N (Siddeley " Lynx " IV).

AVRO " TUTOR "

(Siddeley " Lynx " IV C, 7-cyl. air-cooled radial, 215 h.p.)

After comparative trials lasting three years, during which numerous types of training aircraft were tested, the Avro " Tutor " was adopted in June, 1932, as the standard training aeroplane of the R.A.F., replacing the Avro 504 N. The machine is efficient because it bears the same relation to modern military types of aircraft as did the original Avro 504 K to military types of 15 years ago.

AVRO 50

(Siddeley " Lynx " IV, 7-cyl. air-cooled radial, 184 h.p.)

A descendant of the most widely used training aeroplane ever built, the Avro 504 K, this machine has been for many years the standard training machine of the R.A.F., and the replacement type, the Avro " Tutor," has but recently been issued. The 504 N is an easy aeroplane to fly and is designed to withstand rough usage in the hands of students.

FLYING BOATS

SHORT R 6/28

(6 Rolls-Royce " Buzzards," 12-cyl. " Vee " water-cooled, 825 h.p.)

This is the largest and most powerful aircraft at present possessed by the R.A.F., and has a wing span of 120 ft. The gross weight is in the neighbourhood of 74,000 lb. Six moderately supercharged Rolls-Royce " Buzzard " engines, giving a maximum power of 930 h.p. at sea level, are mounted in three tandem pairs in rather a similar fashion to the " Kestrels " in the " Singapore II." All-metal construction is employed, except for the covering of the wings, which is fabric.

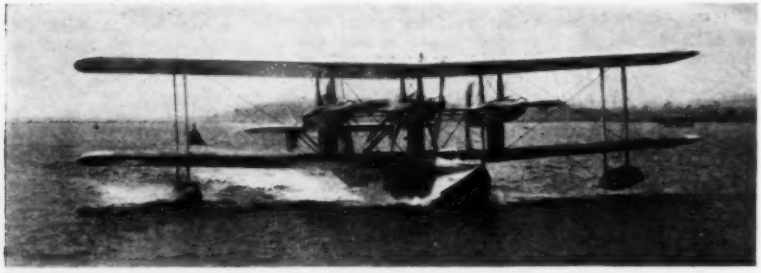
At present the machine is still undergoing trials at the Marine Aircraft Experimental Establishment, Felixstowe.

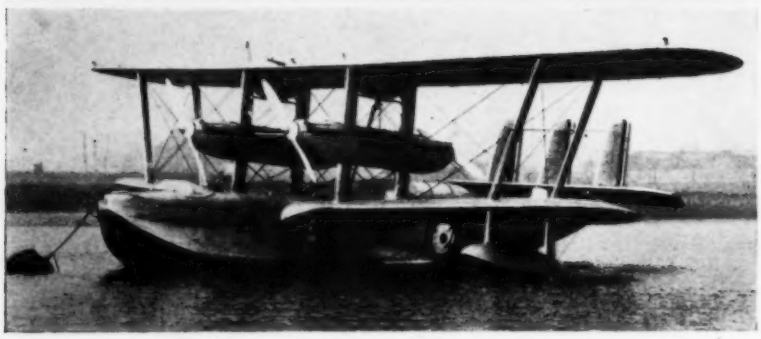
SHORT " SINGAPORE

(4 Rolls-Royce " Kestrels," 12-cyl. " Vee " water-cooled, 525 h.p.)

A batch of aircraft of this type is at present under construction in the works of Short Bros., at Rochester, for the equipment of a R.A.F. Squadron. The machine has quite an exceptional performance for a flying boat, as it is a remarkably " clean " aircraft and is driven by four Rolls-Royce " Kestrels " mounted in tandem pairs. The gear ratios of the rear engines are different from those of the engines in the nose, for the rear propellers are working in the slipstream of the forward airscrews.

A heavy bomb load may be carried beneath the lower planes, and four Lewis guns on Scarff mountings are provided, one in the bows, two amidships and one in the stern. When used for long-distance reconnaissance work the machine has a range of about 1,100 miles. The top speed is over 140 m.p.h., the cruising speed 105 m.p.h., the gross weight 32,000 lb., and wing area 1,750 sq. ft.



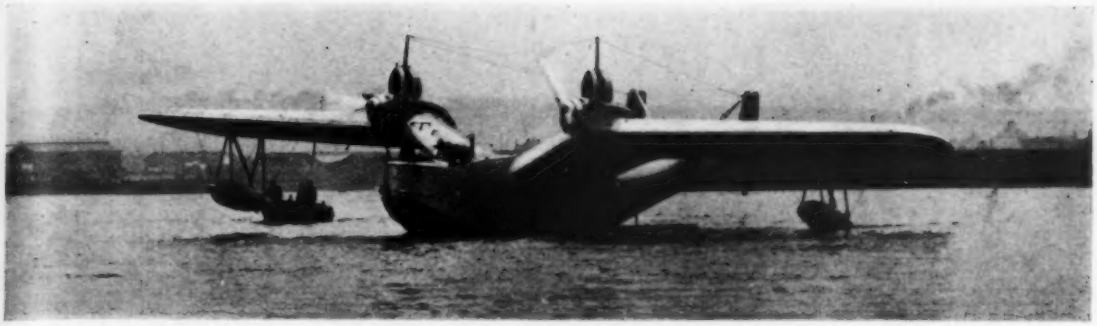


Short R6/28 (six R.R. " Buzzard ") (top), and (bottom) Short " Singapore " (four R.R. " Kestrel ").

SHORT R2

(2 Rolls-Royce " Goshawk," 12-cyl. " Vee " steam-cooled, 575 h.p.)

This machine is one of the most interesting aircraft produced during the past year. It is immediately apparent that it embodies several unusual features. It has been nicknamed the " knuckle duster " owing to the unorthodox formation of the wings, which are of the " gull " type and have, up to the present, been used only on comparatively small aircraft. No performance figures may be quoted, but there are rumours of something exceptional.



Short R.24/31 (two Rolls-Royce "Goshawk").

BLACKBURN "PERTH"

(3 Rolls-Royce "Buzzard" II M.S., 12-cyl. "Vee" water-cooled, 825 h.p.)

The "Perth" is a modernised version of the Blackburn "Iris," which has proved itself such a remarkably fine and seaworthy boat. One of the most interesting features is the quick-firing 1½-pounder Vickers-Armstrongs gun mounted in the nose. This may be used for attacking submarines and similar objects.

A sharp V bottom to the hull serves to lessen the shocks of landing and taxying in a heavy sea. Normally, a crew of five is accommodated and, besides the quick-firing gun, about 2,000 lb. of bombs and two machine guns are carried. The top speed is 132 m.p.h., service ceiling 11,500 ft., maximum range about 1,500 miles, wing area 2,511 sq. ft. and gross weight 38,000 lb.

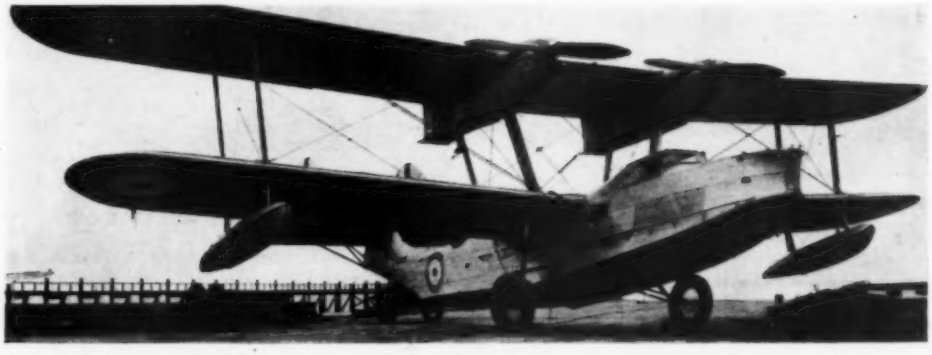
Blackburn "Perth" (three Rolls-Royce "Buzzard" II.MS).

SUPERMARINE "SCAPA"

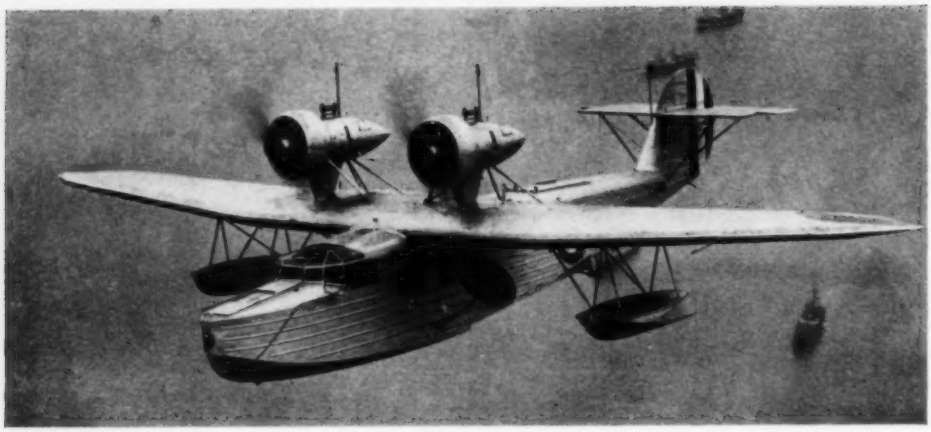
(2 Rolls-Royce "Kestrel" III M.S., 12-cyl. "Vee" water-cooled, 525 h.p.)

Designed to replace the well-tried "Southampton" flying boat, hero of many a long-distance flight, the "Scapa" has been adopted as the standard reconnaissance flying boat by the R.A.F. The machine may be employed for reconnaissance, bombing, torpedo transport, training and navigational instruction. The manufacturers claim that the top speed and ceiling are higher, the range greater, and the take-off quicker than any flying boat, irrespective of size or

Saro R.24/31 (two Bristol "Pegasus" III).



Supermarine "Scapa" (two Rolls-Royce "Kestrel" III.MS).



Saro " Cloud " (two Siddeley " Serval ").

power, at present in service. When carrying full military load, the machine has been flown on one engine. It is extremely seaworthy and embodies all the experience gained during the employment of the " Southampton " abroad.

The engines are mounted immediately below the top planes, where their airscrews are clear of the spray. When used for long cruises, sleeping accommodation, food and water storage, cooking arrangements and other special equipment is provided.

SARO R 24/31

(2 *Bristol " Pegasus " III, 9-cyl. air-cooled radial* 665 *h.p.*)

This is an experimental aircraft designed for long-range patrol and reconnaissance work over the open sea. Two of the latest pattern Bristol " Pegasus " engines cowled by polygonal Townend rings are mounted beneath the top planes. The machine is a development of the Saro A.7 flying boat which, fitted with three Bristol " Jupiter " engines, made a non-stop flight from Gibraltar to Plymouth and proved itself remarkably seaworthy.

SARO " CLOUD "

(2 *Siddeley " Serval " 10-cyl. air-cooled radial* 340 *h.p.*)

Recently introduced in the R.A.F. for instructional work in navigation and flying-boat training, the " Cloud " is the only amphibian used in the Service. Several students of navigation may be instructed simultaneously within the roomy hull, for charts and maps are easily handled and the windows are large, giving the pupils a good view of the sea and coast below.

An experimental version of the " Cloud " with a mono-spar wing may be seen in the New and Experimental Types Park.

EXPERIMENTAL

WESTLAND PTERODACT

***De Havilland " Gipsy " III, 4-cyl. inverted " in line "* (120 *h.p.*)**

Designed by Capt. G. T. R. Hill and built by the Westland Aircraft Works, the " Pterodactyl " in its present form is a three-seater cabin machine with a " Gipsy III " engine. The machine has no tail, the swept back wings giving fore and aft stability. The ailerons form the functions of fore and aft and lateral control. Used together, they act as elevators, but when used in opposition they act as normal ailerons. Rudders on the wing tips give directional control. The maximum speed is about 110 m.p.h.

Westland " Pterodactyl " (D.H. " Gipsy III ").

IN THIS ISSUE

MANY special features and exclusive illustrations are included in this enlarged number of FLIGHT, dealing particularly with the R.A.F. Display next Saturday, June 30.

Apart from the usual weekly features, readers are directed to Maj. F. A. de V. Robertson's contribution, " THE R.A.F. AND THE EMPIRE " (pages 622 to 630), in which the composition and work of the various R.A.F. squadrons at home and abroad are discussed. A series of 63 squadron badges accompany the article.

" At the Display " (pages 651 to 656) forms an illustrated review of the various types of aircraft to be seen at Hendon next Saturday, whilst in " New and Experimental " (pages 631 to 637) a number of exclusive pictures are published for the first time, with a description of the new types to be shown in the Experimental Park at the great R.A.F. Display.

In " Armament " (pages 638 to 644) some highly interesting comments appear on the subject of aircraft weapons, together with a specially prepared double-page drawing showing a modern General Purpose type craft with its complete armament.

" Aircraft Engines " (pages 657 to 659) consists of an illustrated review with instructive data about various types of power units in service to-day.

NEXT WEEK

In the next special issue of FLIGHT, dated July 5, there will be a fully illustrated report of the R.A.F. Display, a review with many illustrations of the Aircraft Exhibition at Hendon arranged by the Society of British Aircraft Constructors, an extended section of " Private Flying " with introductory notes by Lord Sempill, A.F.C., F.R.Ae.S., and the usual regular features. Copies should be ordered in advance.

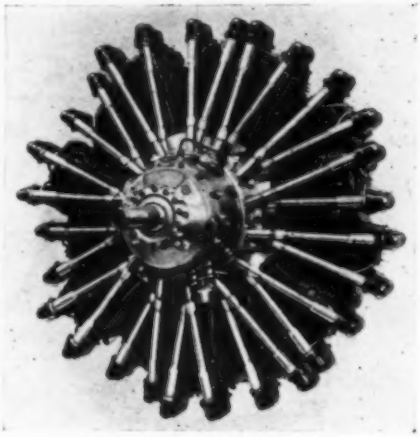
AIRCRAFT ENGINES

Types of power units at the Display

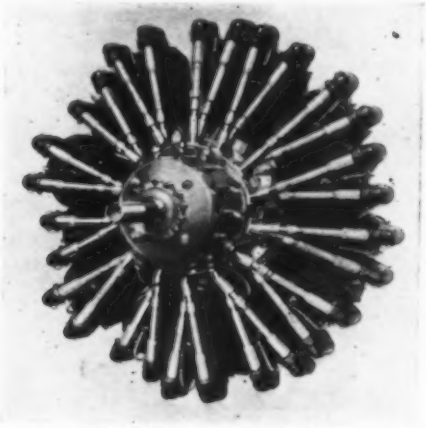
In studying the various aero engines, some of our readers may be puzzled by the symbols written after the names. In the case of the Rolls-Royce types: "I" means that the engine is geared 0—632 : 1; "II," 0.552 : 1; and "III," 0.475 : 1. The letter "B" after this figure denotes that the engine is a high-compression type but unsupercharged; "M.S.," that it is "moderately supercharged"; and "S," that it is fully supercharged. The "F," after the series number of a Bristol engine denotes that it uses the "F" type cylinder, introduced four or five years ago.

WITHOUT adequate power the efforts of our aircraft designers would not be the success they are. Every year the cry comes for more power so that the performance may be even more than before, and seldom do the engine designers fail to give what is wanted. Nowadays we are able to get more power out of less weight of engine than has been obtainable before, but, unfortunately, the magnificent results of our engine designers are sometimes rather overshadowed, as people are apt to look upon the aeroplane as a unit and to forget the engine altogether. In the following pages we give the salient details of the engines fitted to those aircraft which are flying at Hendon on Saturday. Like all engines used in the R.A.F., they are made in many sub-types, and may be supercharged or geared, or not, according to the work for which they are required.

THE ARMSTRONG-SIDDELEY RANGE

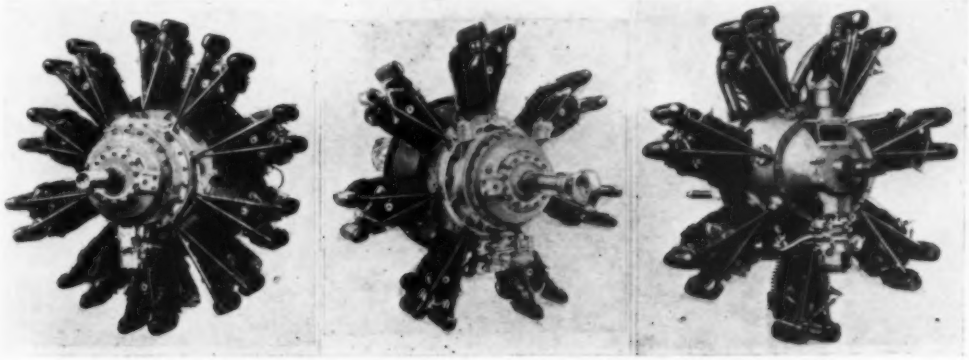


The 670-h.p. "Tiger."



The 525-h.p. "Panther."

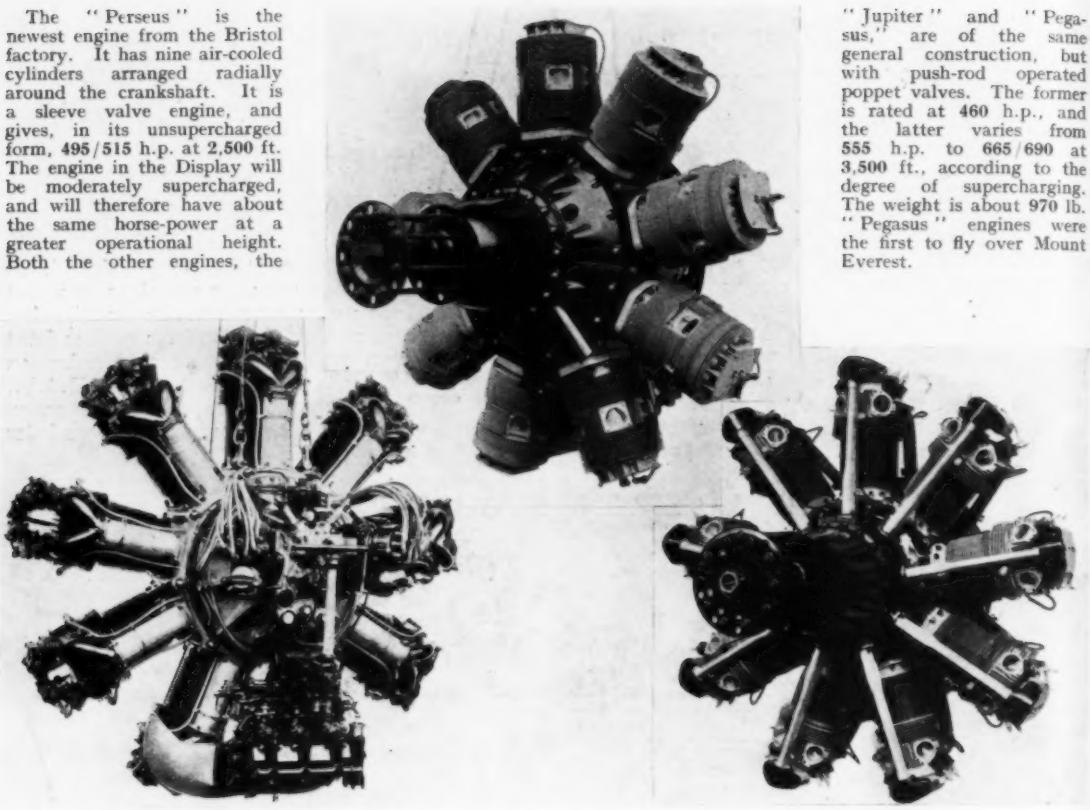
AIRCRAFT engines made by Armstrong-Siddeley Motors, Ltd., cover a wide range; all are air-cooled radials. The "Tiger" is a fourteen-cylinder engine with two staggered rows of seven; it is rated at **670/700** at **5,000** ft. Epicyclic type reduction gearing is fitted to some engines of this range. The "Panther" is a smaller version of the "Tiger," giving **525** h.p. The "Serval" is a ten-cylinder double-row radial rated at **340/368** h.p. in the ungeared form. The "Lynx" is a seven-cylinder single-row engine, giving **215/240** h.p. The "Civet," until recently called "Seven Cylinder Genet Major," is very much like the "Lynx," but smaller, and is rated at **140/152** h.p. Siddeley engines cover the widest range of any aero engine manufacturer.



The 340-h.p. "Serval." **The 215-h.p. "Lynx."** **The 140-h.p. "Civet."**

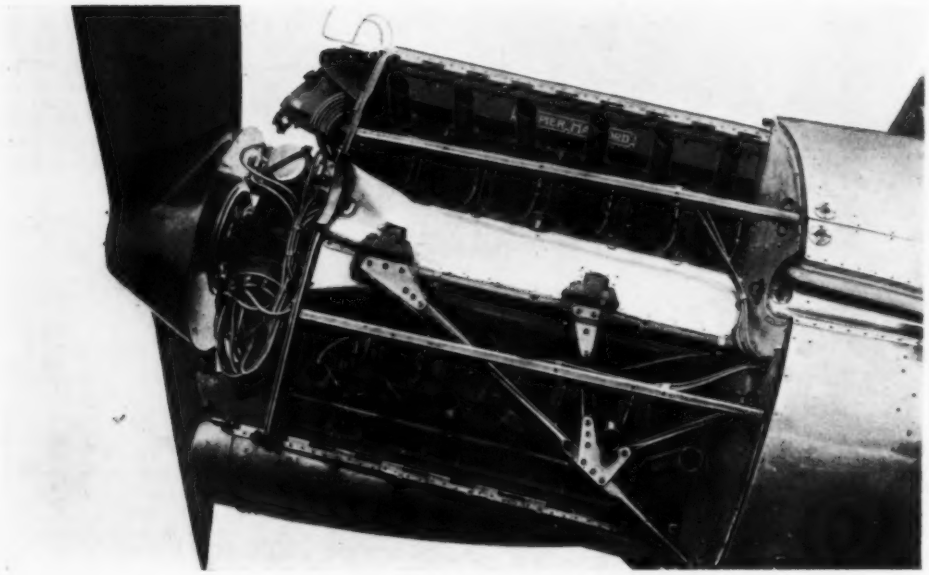
THE BRISTOL TYPES

The "Perseus" is the newest engine from the Bristol factory. It has nine air-cooled cylinders arranged radially around the crankshaft. It is a sleeve valve engine, and gives, in its unsupercharged form, 495/515 h.p. at 2,500 ft. The engine in the Display will be moderately supercharged, and will therefore have about the same horse-power at a greater operational height. Both the other engines, the "Jupiter" and "Pegasus," are of the same general construction, but with push-rod operated poppet valves. The former is rated at 460 h.p., and the latter varies from 555 h.p. to 665/690 at 3,500 ft., according to the degree of supercharging. The weight is about 970 lb. "Pegasus" engines were the first to fly over Mount Everest.



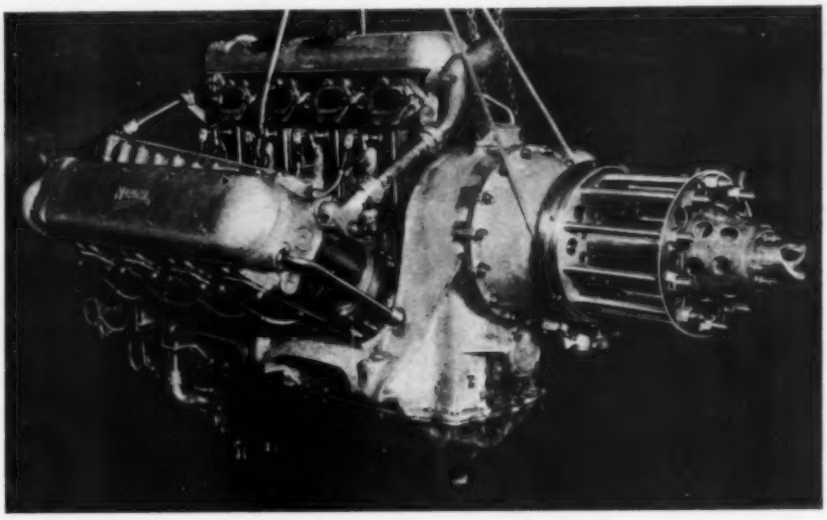
The 460-h.p. "Jupiter." The 495-h.p. "Perseus." The 555-h.p. "Pegasus."

THE NAPIER SERIES



The 24-cyl., air-cooled, 670-h.p. "Dagger."

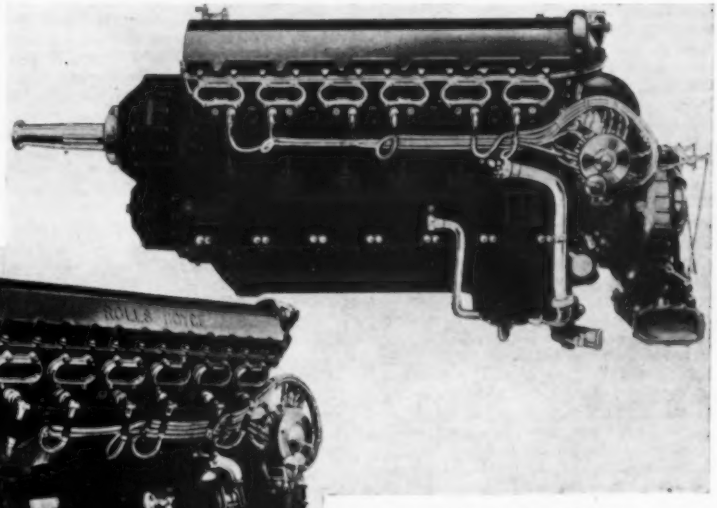
An interesting new engine built by D. Napier & Son, Ltd., is the twenty-four cylinder air-cooled "Dagger." This engine, which was designed by Maj. Halford, has the cylinders arranged H-fashion, with six cylinders at the end of each arm, twelve upright and twelve inverted. The maximum power output is 675/705 at 12,000 ft. for a weight of 1,280 lb. It is geared, the maximum r.p.m. being 4,000. Another Napier engine is the "Lion." Its twelve water-cooled cylinders are in three banks of four, *a la* broad arrow. As seen at Hendon it develops 450 h.p.



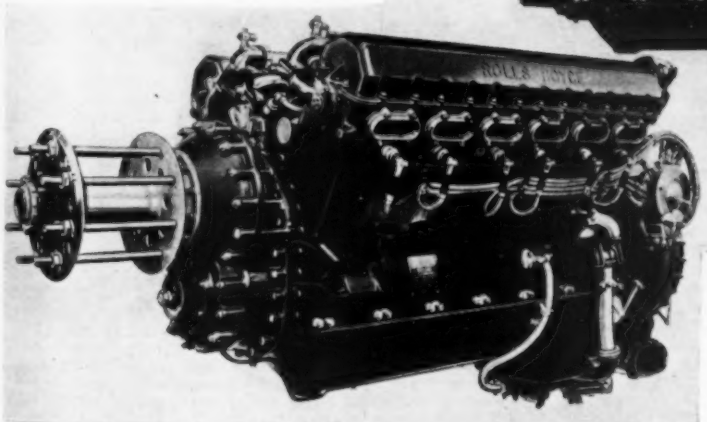
The 450-h.p. water-cooled "Lion."

THE ROLLS-ROYCE ENGINES

The "Goshawk" is a new production of the Rolls-Royce Company, and is a development of the well-known "Kestrel," which it closely resembles. It incorporates features tried out in the engines built for the Schneider Trophy Contests. Like the "Kestrel," which will be seen in large numbers at the Display, the "Goshawk" has twelve cylinders arranged in Vee fashion. Unlike the former engine, it is steam cooled instead of water cooled, thus saving both weight and frontal area. The "Goshawk" II and III are both fully supercharged, and develop 575/600 h.p. at 11,500 ft.; the VIII is moderately supercharged and gives 665 h.p. at 3,000 ft. The "Kestrel" gives 525 h.p. for a weight of about 922 lb. The "Buzzard" is a larger version of this engine, and almost identical in construction; it develops 825 h.p. for a dry weight of 1,530 lb.



Above, the 825-h.p. "Buzzard."



Left, the 525-h.p. "Kestrel."

COMMERCIAL AVIATION

—AIRLINES — AIRPORTS—

CROYDON

MONDAY last was a day of considerable activity at the Airport. There was, for instance, the demonstration of the "Heinkel" mail carrier in the morning. If one saw it sideways, it was like some strange aerial torpedo shot from a gun. Press representatives were flown around in a D.L.H. service machine, whilst the new monoplane danced round them like a swallow round a rook. The demonstration was perhaps more interesting to military-minded spectators than to civil aviation people. Lord Willingdon, with Lady Willingdon, and Lord and Lady Rattenden, arrived a little later in the morning on their way home from India. They came by *Scylla* and were much impressed by the size and luxury of the machine, I hear.

The use of the captain's special door and gangway by the Viceregal party was an innovation. It made the arrival and welcome much easier and more impressive. The height of the cockpit in this type of machine is considerable, and there are thirteen or fourteen steps to the captain's gangway. As an expression of purely personal opinion, I should say that the words, "Imperial Airways" on the side of the gangway would be more in keeping with dignity if they were much smaller. That well-known cricketer, Duleepsinhji, was aboard the same machine. He went out to India by Imperial Airways a short time ago to attend the wedding of his brother.

The Crown Prince of Bavaria also came from Cologne by the Imperial Airways service on Monday. There was an old-world display of personal affection and loyalty at the Airport. Much bowing and kissing of hands by a group of adherents. It was quite pleasant to witness in these rather unromantic days. Then there was the arrival by special charter in an Imperial plane of a party of American soldiers of the Lafayette Regiment, led by Col. Tobin. They had come to Plymouth in the s.s. *Lafayette*, and they left Croydon again by the 8 a.m. Imperial departure for Paris, where they were attending a ceremony in connection with the "Lafayette" centenary.

I believe they had special permission to bring their rifles into this country. They had with them also their regiment's original type of uniforms, which, they said, needed plenty of time to get into.

On Thursday the Emir of Transjordania visited the Airport with his suite. He was an impressive figure in black robes. He was delighted with his flight over London in *Scylla*. I often wonder what these various Eastern visitors think of the rather queer "oriental" carpets the authorities lay down all over the place. They are always covered with dusty footprints long before the important personages arrive. The Emir had a most genial manner and, it is said, greeted those presented to him with a breezy "Hulloa." Disconcerting to the officials there assembled, but very jolly from the human standpoint.

As a peculiar anti-climax to all this came "Prince" Monolulu, the well-known racing tipster, complete with feathered head-dress, red garments and regalia, shouting tips to the Airport staff as he entered the Sabena machine on Friday. He gave "Enfield" for the Hardwicke Stakes, Ascot, and a lot of people followed his advice. The horse came in third. On the same plane was the Belgian Ambassador to London, bound for Brussels. "Prince" Monolulu was going to Copenhagen.

I have heard several anecdotes recently illustrating the lack of understanding "in other places" of the progress made in civil flying on the inter-Continental air routes. Authorities call for statistics of flights abandoned for high winds, for example, and are amazed to be told that commercial pilots practically never cancel for this reason. Service visitors in really foggy weather, too, scarcely believe their own eyes when machine after machine of different nationalities takes off along the white chalk line in thick fog. When companies show 99.5 per cent., and even 100 per cent., regularity figures month after month, with monotonous regularity, many people who should know better believe the figures are faked in some way.

Referring back to the increasing use of air transport by royalty, is it not time the Airport of London had a Royal entrance and Royal waiting rooms? Railway stations have these things, and the growing importance of air travel makes proper accommodation of this sort a necessity. Commercially, also, anything enhancing the dignity and importance of London's Airport is not to be neglected.

It is said that the new Fokker F.36 has flown at Amsterdam and may be seen at Croydon shortly.

A. VIATOR.

HESTON

A FEW days ago a passenger in a very bad state of health was brought from Jersey to Heston on the regular airline with the very minimum of fatigue, by replacing two passenger seats with a pneumatic mattress. Many other invalids have arrived at Heston by airliner in the last few months, and it seems that the travelling public is beginning to realise that the air is a less fatiguing element than land and water.

During the week ending June 16, the British Air Navigation Co., Ltd., were working to capacity, and covered over 4,070 air miles, for, in addition to regular Le Touquet services, there was a steady demand for special charters to the races at Le Mans. Two Trimotor Fords, a "Dragon" and a "Fox Moth," all full up, made a series of trips. The return flights from Le Mans to Heston were made in two hours. On account of the Grand Prix in Paris and Ascot over here, the authorities in Pourville have asked that the inauguration of the B.A.N.C.O. air service to this resort should be put back one week, and it will accordingly commence on June 29.

The Portsmouth, Southsea & Isle of Wight Aviation Company's "Island Air Express" has carried 335 single-journey passengers since the beginning of June, and 110 during the week ending June 21.

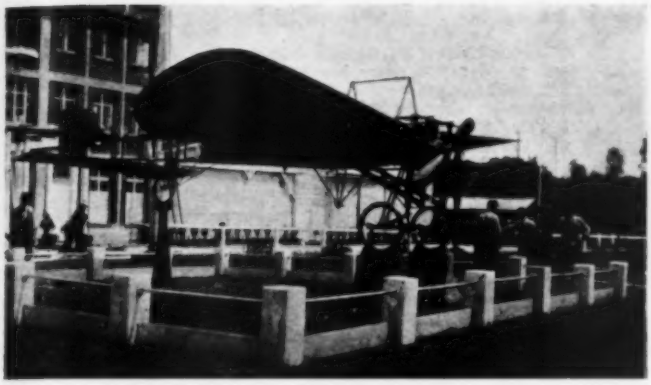
On the morning of June 22, Jersey Airways, Ltd., carried the complete cricket team of Trinity Hall, Cambridge, to play in Jersey. This airline has carried 680 passengers in the first 22 days of June, and 234 in the last week alone.

Wrightson & Pearse have carried over 12,000 lb. of freight since the beginning of the month. Lady Young, the wife of the Governor-General of Northern Rhodesia, chartered a "drive yourself" "Leopard Moth" from Wrightson Air Hire, Ltd., for a Continental week-end. She left for Brussels with one passenger on the 15th, returning from Paris on the following Monday. Wrightson Aircraft Sales, Ltd., the newly-formed company which has taken over the aircraft brokerage and sales department formerly operated by Wrightson & Pearse, has acquired a Klemm "Swallow" for demonstration purposes.

Two-way radio is being fitted by Airwork, Ltd., to eight aeroplanes. These include two Trimotor Fords operated by B.A.N.C.O. (one their own property and one chartered from the Ford Motor Co.); four "Dragons," one belonging to B.A.N.C.O., one to Wrightson & Pearse and two to Jersey Airways, Ltd.; one Stinson, the property of Mr. Irving, of parachute fame, and one Avro "Commodore" recently purchased by Mr. W. Westhead. This last is of especial interest, as Mr. Westhead, who is a radio amateur, has designed the set himself and had it passed by Farnborough.

A BLERIOT ANNIVERSARY

The Buc Franco-British Aviation Garden Party



1909-1934 : The Blériot monoplane (25-h.p. Anzani 3-cyl. air-cooled " fan-type " engine) on which M. Blériot flew the Channel on July 25, 1909, on view at Buc Aerodrome last Saturday. On the right is shown M. Laurent Eynac—usually, but not at present, French Air Minister—Lord Londonderry, and M. Louis Blériot beneath the latter's historic machine at Buc.

A FRANCO-BRITISH AVIATION GARDEN PARTY, given by the French Air Ministry in conjunction with the Touring Club, the Aero Club of France and the Associated French Aero Clubs, in honour of the flight across the Channel made by Louis Blériot in 1909, took place at the Buc Aerodrome on Saturday last. It was preceded by a Competition of Elegance and Comfort for Tourist Planes (Concours d'Elegance et Confort), organised by the Paris aviation journal *l'Air* and the daily sports paper *l'Auto*, who donated the prizes that were awarded.

The Buc Aerodrome Building had been especially fitted up for the occasion, a large porch with a canvas roof being erected in front of the main club-house, and the spacious room on the ground floor decorated with a liberal supply of plants, gave a very pleasing effect. The monoplane in which Blériot made the Channel crossing was mounted on a stand in front of the club-house, having been taken from the Chalais Meudon Museum for this purpose. Throughout the afternoon the band of the 21st Colonial Infantry played French and British national airs alternately, while tea was served and dancing followed on the porch and ground floor of the club-house.

M. Albert Lebrun, the President of the Republic, presided over the Garden Party, assisted by General Denain, the Air Minister, and the distinguished English visitors included the British Air Minister, Lord Londonderry, and Air Vice-Marshal Joubert de la Ferte, while a British Fighter Squadron was also present and took part in the flying display. Many of the guests arrived by air, a number of the ladies having somewhat elaborate costumes, and in some cases the pilots wore grey top hats!

The " Elegance and Comfort Competition " for Tourist Planes was the first event on the programme, with the judging beginning promptly at 3 o'clock. The Jury was composed of the Marchioness of Noailles, an ardent air tourist, MM. Etienne Riché, President of the Aero Club of France, Chief Engineer Louis Hirschauer, Director of Tourist Aviation in the Air Ministry, the Count de Foy, a pilot himself, Herve Lauwick, Labourdette and Gabriel Doumergue, all well-known aviation enthusiasts.

Some nineteen planes were entered in this competition, divided into three classes for cabin planes and one for open cockpit machines. The classes for cabin planes were as follows:—(1) Planes equipped with engines up to 135 h.p. ; (2) those with engines between 135 and 150 h.p. ; (3) planes with motors of 150 h.p. and over.

The first prize in Class 1 for cabin planes was awarded to a D.H. " Leopard Moth," equipped with a " Gipsy Major " engine, in Class 2 the first prize went to a Caudron " Phalene " (Renault " Bengali " 130-h.p. engine), while in the Class 3 the Farman cabin monoplane, type 392 (Farman 220-h.p. engine), gained the first honours.

The first prize in the open cockpit class was won by a British Miles " Hawk " monoplane with a French registration number.

The British Air Minister, Lord Londonderry, arrived at Buc about 4 o'clock, and accompanied by his French colleague, General Denain, M. Louis Couhe, Director of Civil Aviation, and other notabilities, made an inspection of the tourist planes assembled for the competition. Lord Londonderry had previously landed at the le Bourget Airport about noon, having flown over from England in a Hawker " Hart," piloted by Sqd. Ldr. John Whitford, escorted by another Hawker " Hart " piloted by F/O. Ridgeway. Lord Londonderry was welcomed on landing at le Bourget by General Denain and the British Ambassador, Sir George Clerk, and had lunch in Paris. No. 23 (Fighter) Squadron, R.A.F. (Hawker " Demons "), also flew over, landing at le Bourget about noon, and taking part later in the displays at Buc.

M. Albert Lebrun, President of the Republic, arrived at Buc about 5 o'clock, and the official ceremony of the day around the Blériot plane took place. General Denain made a short introductory speech welcoming the distinguished guests and explaining the purposes of the celebration. Lord Londonderry, in replying, briefly traced the development of aviation since Blériot made his historic flight across the Channel, and congratulated him on marking the way for the subsequent great progress made. In conclusion, Louis Blériot himself replied with a neat speech of thanks, being evidently much affected at the honours shown him.

At the conclusion of this ceremony the Official Party ascended to the roof of the club-house, and watched a stunting exhibition by Massotte, the Blériot pilot, and evolutions by pursuit squadrons from the Etampes and Dijon bases, equipped with Morane-Saulnier type 225 Pursuit planes. Maurice Arnoux, winner of the Deutsch Cup Speed Race last month, made a " presentation " flight of his Caudron plane around the airport, while a replica of the Blériot that first crossed the Channel was towed out on the field by a tractor to show the comparison between the machines of 25 years ago and to-day. The " Demons " of No. 23 (Fighter) Squadron then arrived from le Bourget and carried out various well-executed manœuvres, flying in different formations, and then landing on the aerodrome.

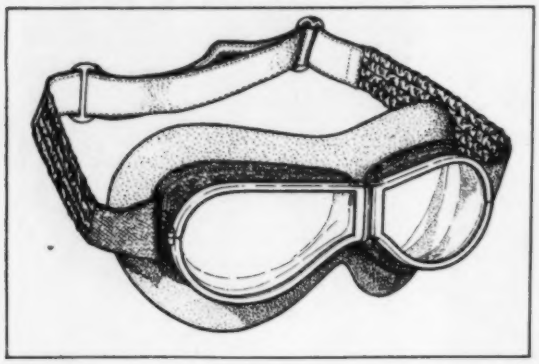
After this a parade of about 150 French planes from the Etampes and Dijon bases, composed of squadrons of pursuit, observation and bombing planes, all flying in perfect formation, passed over the Buc aerodrome, to be reviewed by the President of the Republic.

The proceedings of the day closed with the awarding by President Lebrun of the various prizes that had been won in the Tourist Plane " Elegance and Comfort Competition," and his hearty congratulation of the winners.

R. C. W.

GOGGLE DEVELOPMENT

WE all know the trouble that can sometimes be experienced with goggle elastic and its adjustment. In a new type that has been sent to us by D. Lewis, Ltd., of 124, Great Portland Street, W.1, the buckles adjustment is



arranged on a leather section of the band, the rest of which is of protected steel springs. The goggles themselves have a sponge-rubber mask shaped to fit the face without pressing on the bridge of the nose, and have Triplex Safety Glass lenses in a ventilated frame.

NEW PARACHUTE FACTORY

SITUATED at Icknield Way, Letchworth, Herts, England, the new factory of the Irvin Air Chute of Great Britain, Ltd., was opened recently, and a formal inspection made by a number of guests was arranged last Thursday. Irvin Air Chutes, whose manufacture has often been described in our pages, have now saved nearly 1,000 lives.

New Scholarships

THROUGH the generosity of Viscount Wakefield, who is President of the College of Aeronautical Engineering, two annual scholarships of £150 each have become available for students of aeronautical engineering, and two, incidentally, for automobile engineering. Applications should be made on or before July 27, 1934. Students entering for the scholarship must be at least 17 and not more than 20 years of age on October 1, 1934, and must, of course, be of British nationality. A school certificate standard is essential.

The Royal Air Force Benevolent Fund

THE usual meeting of the Grants Committee of the R.A.F. Benevolent Fund was held at Iddesleigh House on June 14. Mr. W. S. Field was in the chair, and the other members of the Committee present were:—Mrs. L. M. K. Pratt Barlow, O.B.E., Mrs. F. Veasey Holt, Wing Com. H. P. Lale, D.S.O., A.F.C. The Committee considered in all a number of cases, and made grants to the amount of £132 11s.

An Airway Time-Table

AN excellent airway time-table, giving particulars of all the passenger air services, British and foreign, is at last available. The *Airway Time-Table* is produced by Roadway Publications (Polebrook House, Golden Square, London, W.1), and is published monthly, price 3d. In addition to the times of departure and arrival from and to all the important towns and cities of Europe—together with the names of the operating companies, fares, etc.—this time-table includes an alphabetical index (nearly 30 pages) and two maps, one covering the British Isles and the other for Europe. The air services to India and Africa are, of course, included, while the names of British air taxi companies are also given.

A Play to see

A VISIT to the Globe Theatre at the present time is excellent medicine, a palatable mental purge which ought to be taken by everyone with the welfare of aviation at heart. "Meeting at Night," as the play is called, is a satirical de-bunk of the Record Flight Racket cleverly woven together with similar treatment of the Society News Racket. Leonora Corbett, though a trifle unconvincing when making love, lifts the play with great sincerity at the end and permeates it throughout with her exceptional charm. Roger Livesey as the "Stunt-tied" aviator gives a level and well-balanced performance. The satire ought to have been even more savage than it was, to make the purge more lasting.

Northern Heights Model Flying Club.

A LARGE entry has been received for the Grand Gala Rally organised by the Northern Heights Model Flying Club, which will be held on Sunday, July 8, at the Great West Road Aerodrome, Yiewsley (near West Drayton), by kind permission of Mr. C. R. Fairey.

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PUBLICATIONS RECEIVED

National American Advisory Committee for Aeronautics. Report No. 479. *Stability of Thin-Walled Tubes Under Torsion.* By L. H. Donnell. 1933. Price 10 cents. No. 480. *The Aerodynamic Effects of Wing Cut-Outs.* By Albert Sherman. 1934. Price 5 cents. No. 490. *Tank Tests of Auxiliary Vanes as a Substitute for Planing Area.* By John B. Parkinson. February, 1934. No. 491. *Tank Tests of a Family of Flying-Boat Hulls.* By James M. Shoemaker and John B. Parkinson. February, 1934. No. 492. *The Aerodynamic Analysis of the Gyroplane Rotating-Wing System.* By John B. Wheatley. March, 1934. No. 493. *Aerodynamic Rolling and Yawing Moments Produced by Floating Wing-Tip Ailerons, as Measured by the Spinning Balance.* By Millard J. Bamber. March, 1934. No. 494. *Report of Special Committee on Hazards to Aircraft Due to Electrical Phenomena.* March, 1934. No. 495. *Effect of the Surface Condition of a Wing on the Aerodynamic Characteristics of an Airplane.* By S. J. DeFrance. April, 1934. No. 496. *A Preliminary Motion-Picture Study of Combustion in a Compression-Ignition Engine.* By E. C. Buckley and C. D. Waldron. April, 1934. No. 497. *Full-Scale Drag Tests of Landing Lamps.* By C. H. Dearborn. May, 1934. No. 498. *Wind-Tunnel Measurements of Air Loads on Split Flaps.* By Carl J. Wenzinger. May, 1934.

Catalogue

Silver Fox Stainless Steel. United Steel Companies, Ltd., Sheffield.

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NEW COMPANIES REGISTERED

NOTTINGHAM AIRPORT, LTD.—Nominal capital, £3,000 in £1 shares. To carry on the business of carriers of persons for pleasure flights and carriers of passengers, goods and mails in aeroplanes, airships, seaplanes and flying machines and aircraft of all kinds, etc. The permanent directors are:—Joseph J. Hall, "Westfield," Ashington, Northumberland, mining engineer. Lewis W. Hall, The Elms, Glynthrope, Notts, aviation pilot. Thos. W. Shipside, Carrington Street, Nottingham, motor-car agent. Qualification: £100 shares. Solicitor: W. N. Craigs, Ashington, Northumberland.

STAFFORDSHIRE AIRPLANES, LTD.—Capital £100 in 1s. shares. To promote and assist aerial navigation and locomotion; to encourage the study of aeronautics; to develop the sciences connected therewith; to provide, maintain and conduct centres of training in aeronautics, together with aerodromes, flying machines, sports grounds, social club premises and other equipment and conveniences and to permit the same and the property of the company to be used by the members of the North Staffordshire Aero Club. The subscribers (each with one share) are:—Stanley Hawley, Lightwood, Longton, Staffs, and Robert F. E. Parkinson, Tean, Stoke-on-Trent, C.A. The first directors are the members of the Executive Committee (not named) of the said Club as at the date of the formation of the company. No share qualification required. Solicitor: Ernest Hawley, Lightwood, Longton, Staffs.

Increases of Captial

AERO-ELECTRICAL EQUIPMENT CO. LTD., Gambrell Works, Merton Road, Southfields, S.W.18.—The nominal capital has been increased by the addition of £15,000 beyond the registered capital of £10,000. The additional capital is divided into 30,000 7½ per cent. preferred ordinary (not redeemable) shares of 10s. each.

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❖ ❖ ❖ ❖

PATENT AERONAUTICAL SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1932

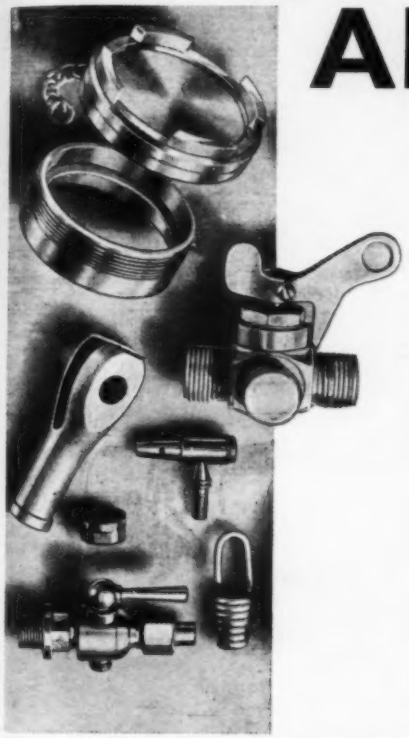
Published June 28, 1934

36,675. J. E. ELLOR. Evaporative cooling systems for internal-combustion engines, particularly for aircraft. (411,199.)

APPLIED FOR IN 1933

Published June 28, 1934

1,868. T. SOMERSCALES. Floating-stations for aircraft. (411,213.)
2,960. DUNLOP RUBBER CO., LTD., GOODYEAR, E. F. WRIGHT and H. TREVASKIS. Controls for aircraft. (411,220.)
5,954. FAIREY AVIATION CO., LTD. and D. L. H. WILLIAMS. Construction of aircraft wings. (411,242.)
13,108. BENDIX AVIATION CORPORATION. Engine-starters. (411,277.)
17,137. A. S. MULLGARDT. Advertising display devices for aircraft. (411,298.)



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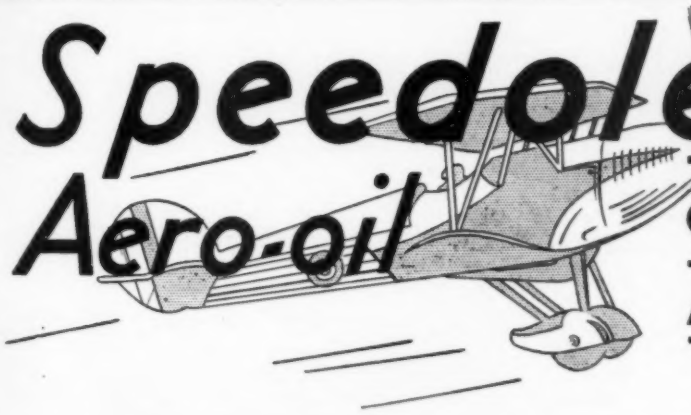

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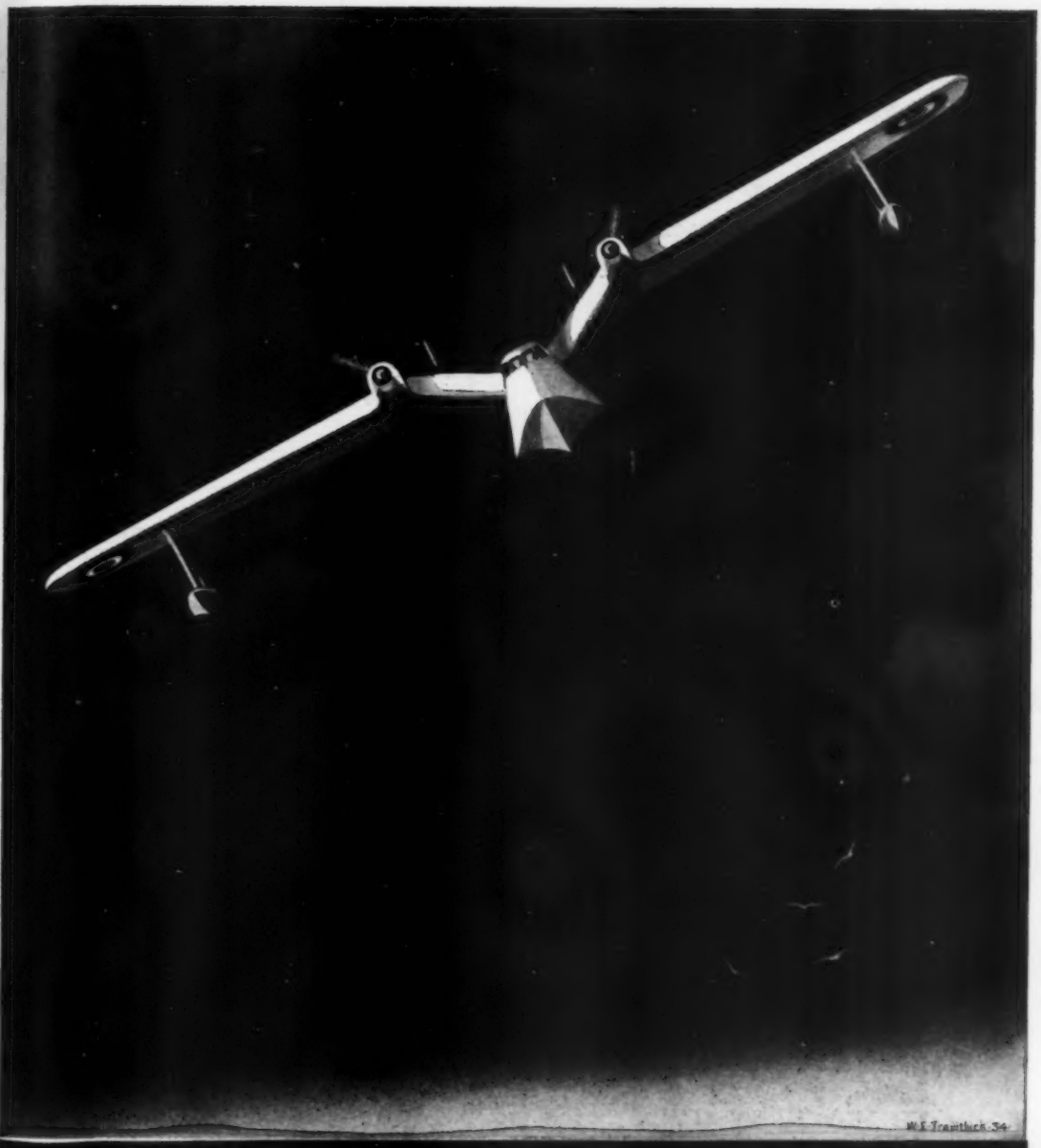

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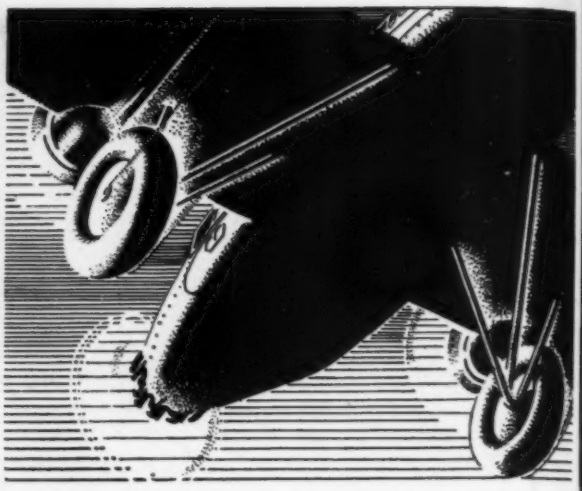

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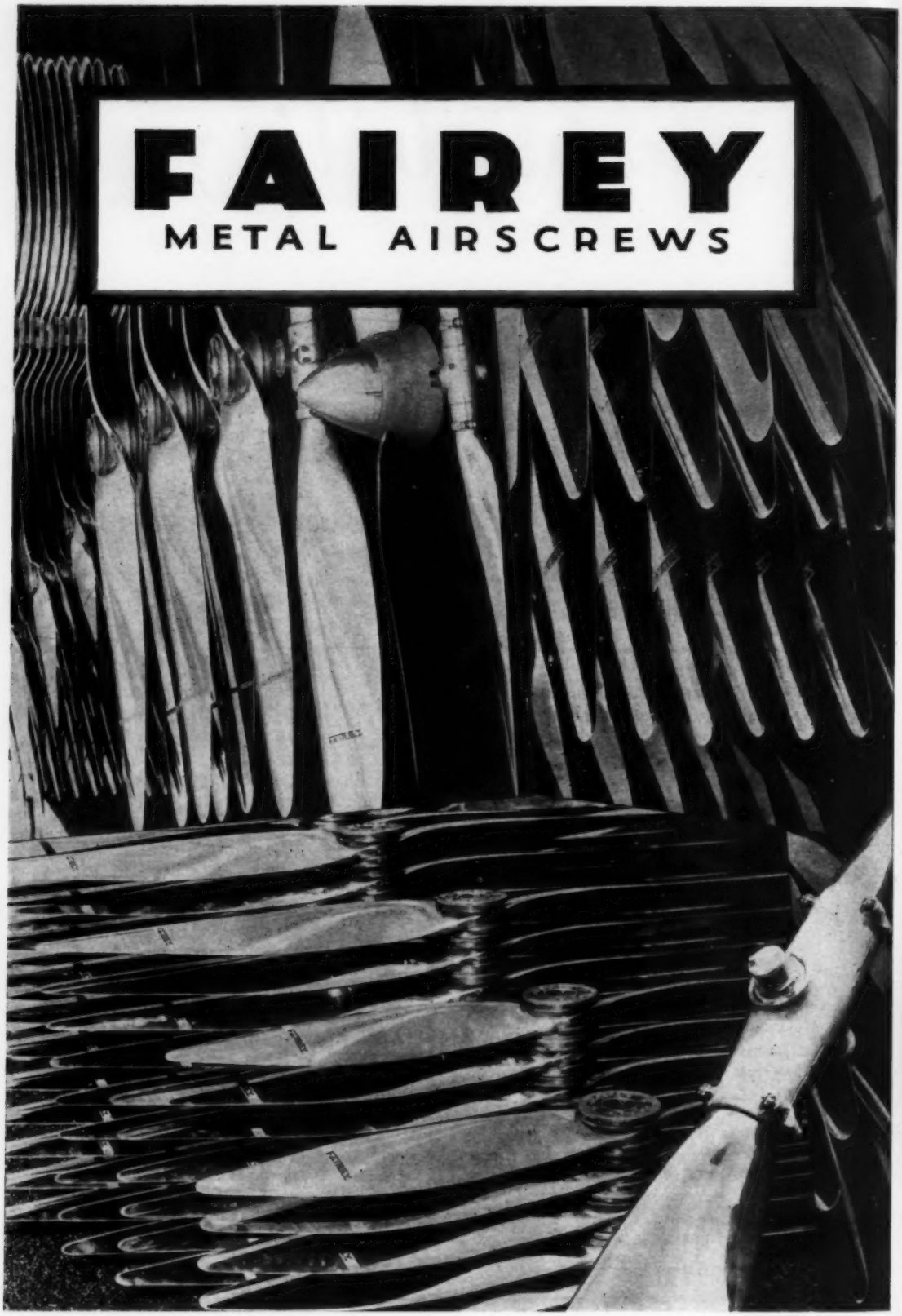
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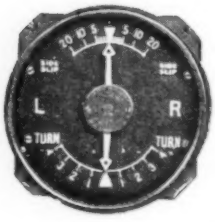

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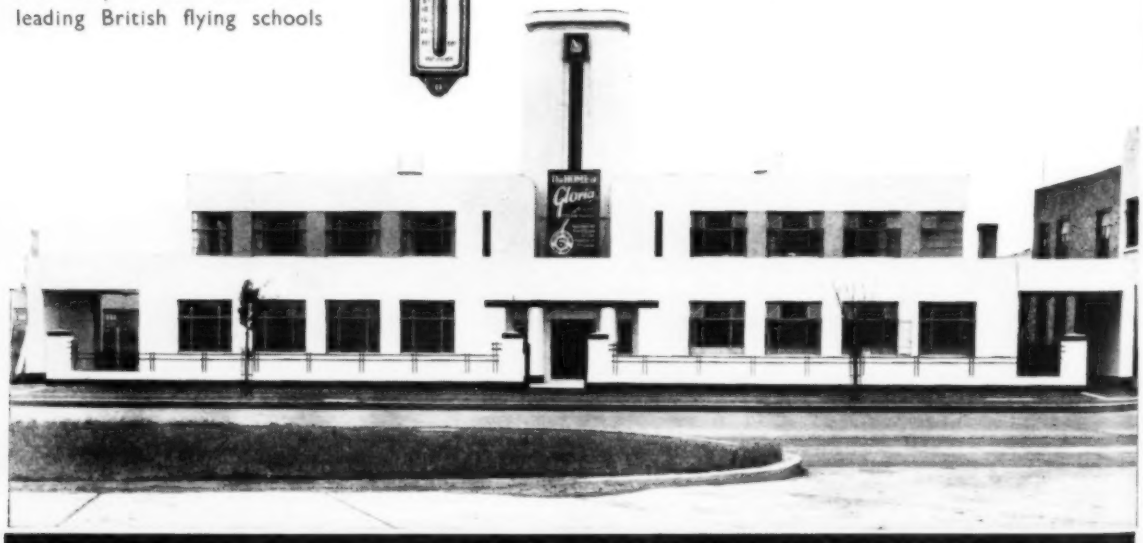

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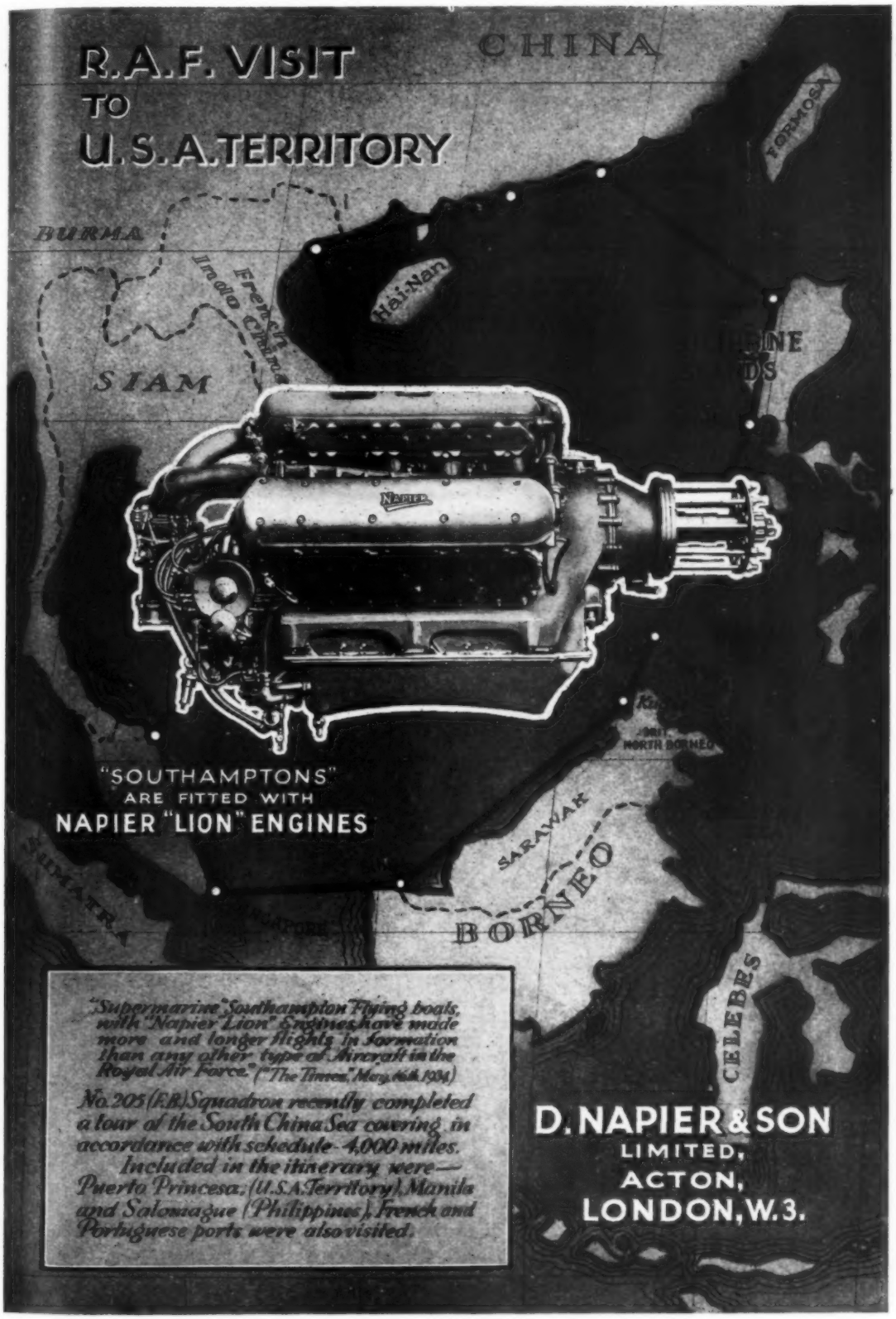
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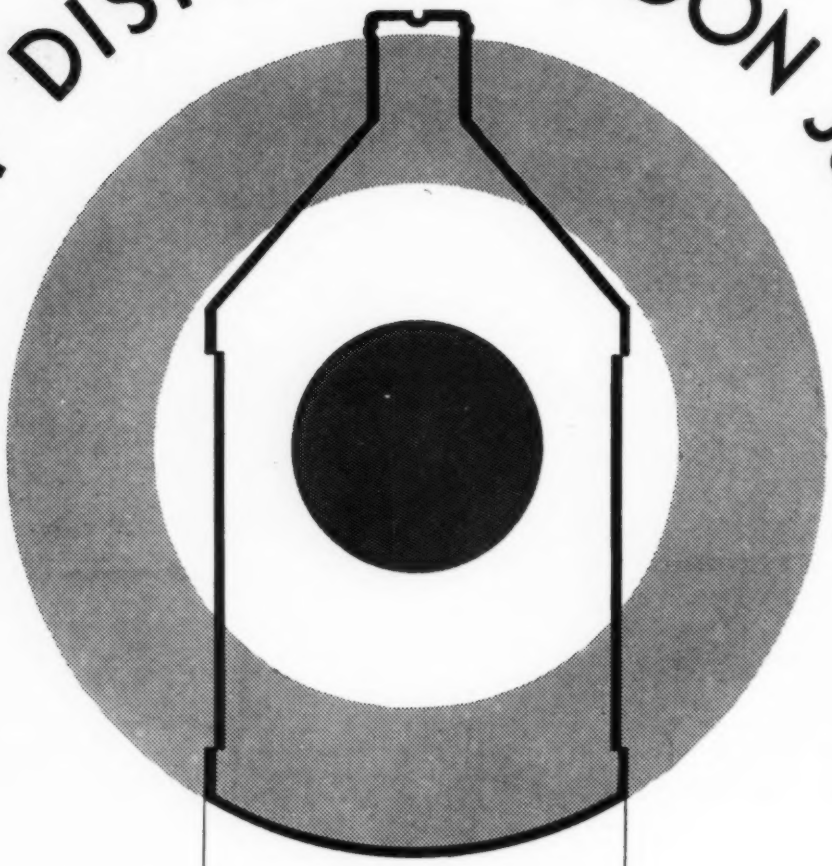

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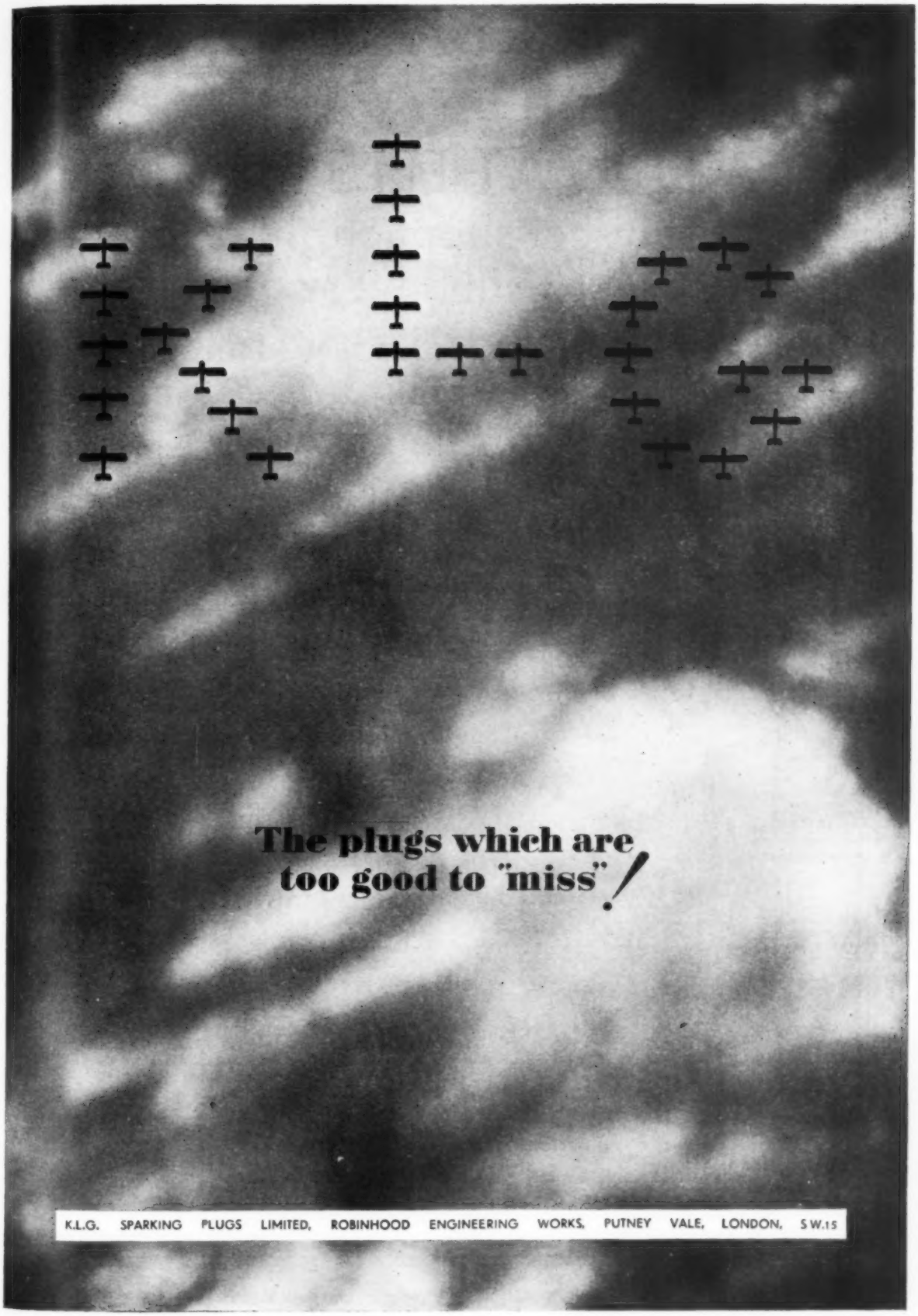
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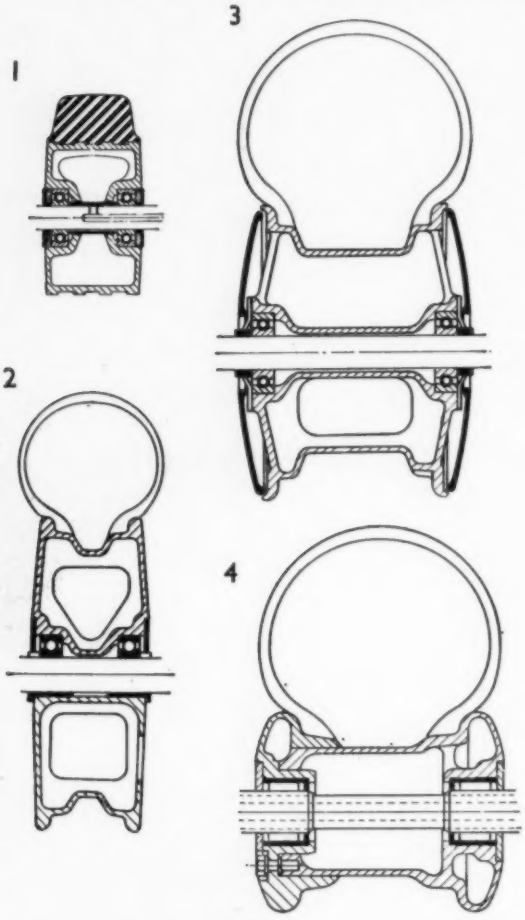

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1919	sFirst Transatlantic Flight by Airship	H. B. M. Airship R.34
1919	sFirst Transatlantic Flight—West to East	Sir John Alcock, K.B.E., & Sir Arthur Whitten Brown, K.B.E.
1920	sFirst Flight England to S. Africa	Col. Sir Pierre van Ryneveld and Wing Cmdr. Sir Quintin Brand, K.B.E.
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1927	sFirst Solo Flight England to S. Africa	Lt. R. R. Bentley
1927	sFirst and every air mail flight between Holland and Dutch East Indies	K.L.M.
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1928	soFirst solo flight by a lady pilot from England to S. Africa	Lady Bailey
1928	oFirst Transatlantic Flight—East to West	Baron von Huenefeld, Capt. Koehl & Colonel Fitzmaurice
1929	soFirst Flight by Chinese pilot from Europe to China	Mr. Wen Lin Tschen and Mr. Johannsen
1929	ssFirst non-stop Flight England to India	Sq.-Ldr. Jones-Williams and Flt.-Lt. Jenkins
1930	sFirst and every air mail flight between France and Indo-China	Air Orient
1930	soFirst Flight by Egyptian pilot from Europe to Egypt	Mohamed Sidky
1930	sFirst solo flight by a lady pilot from England to Australia	Miss Amy Johnson
1930	soFirst solo flight by a lady pilot from England to Japan	Hon. Mrs. Victor Bruce
1930	soFirst solo flight by Indian pilot from England to India (Aga Khan's Prize)	Mr. Engineer
1930	soFirst solo flight by Indian pilot from India to England	Mr. Tata
1930	soFirst Transatlantic Flight by Arctic route	Herr von Gronau
1931	sFirst and every air mail flight between England and South Africa	Imperial Airways
1931	sFirst and every air mail flight between England and Australia	Imperial Airways and Australian National Airways
1931	ssFirst non-stop Flight England to Egypt	Sq.-Ldr.Gayford,D.F.C.,A.F.C. and Flt.-Lt. Bett
1931	sFirst Solo Flight Australia to England	Mr. C. W. A. Scott
1932	sDublin to New Brunswick in 24 hours 10 minutes. First solo Atlantic flight from East to West. First North Atlantic flight in light aeroplane. Fastest East to West crossing of Atlantic	Mr. J. A. Mollison
1932	oFirst flight to an Altitude of 43,976 feet	Capt. C. F. Uwins
1932	soRound the World flight	Herr von Gronau
1932	sRecord flights England to Cape Town and Cape Town to England	Mrs. J. A. Mollison
1933	ssFirst non-stop flight, England to Walfish Bay (South Africa), 5,309 miles	Sq.-Ldr.Gayford,D.F.C.,A.F.C and Flt.-Lt. Nicholetts, A.F.C.
1933	First flight, England to Brazil, including Crossing of South Atlantic	Mr. J. A. Mollison

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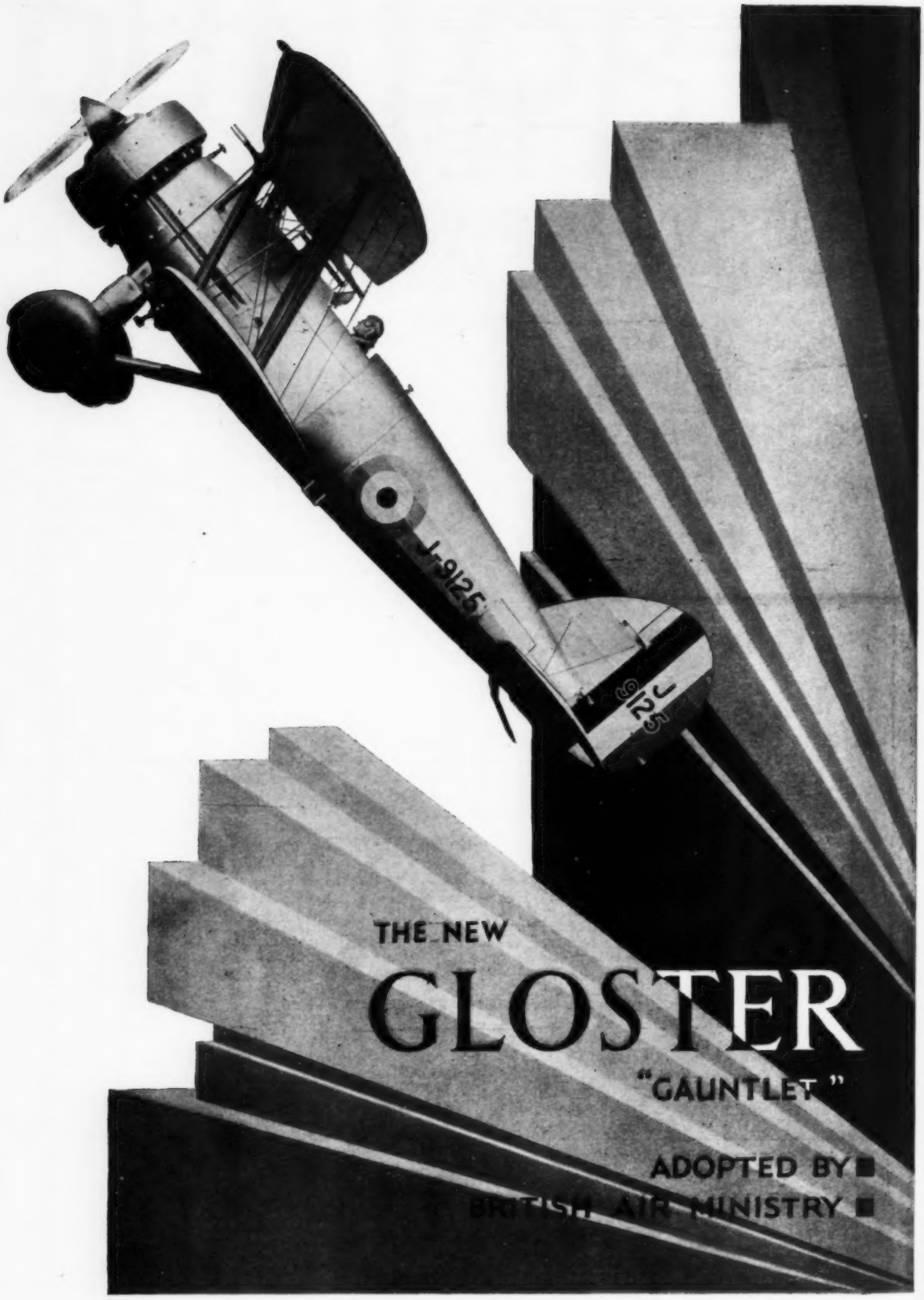
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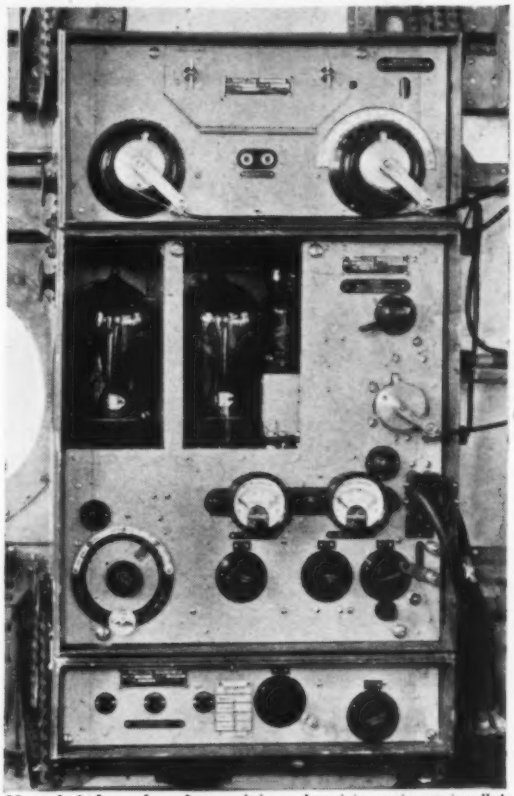

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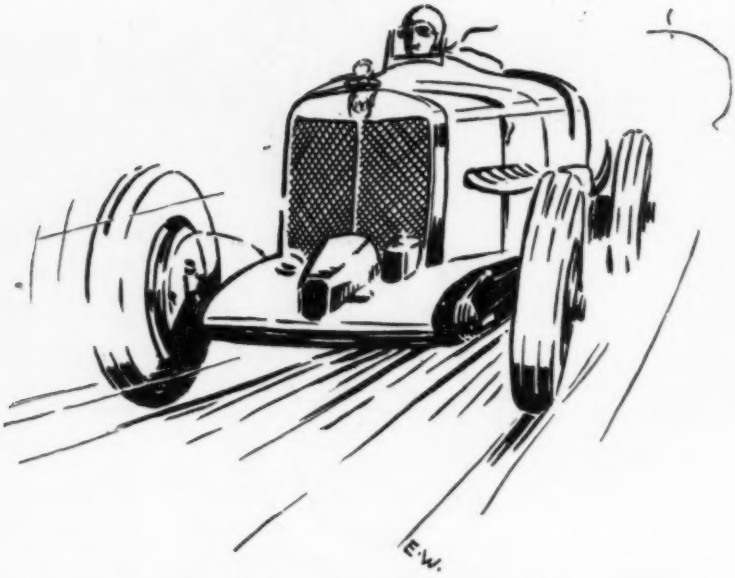

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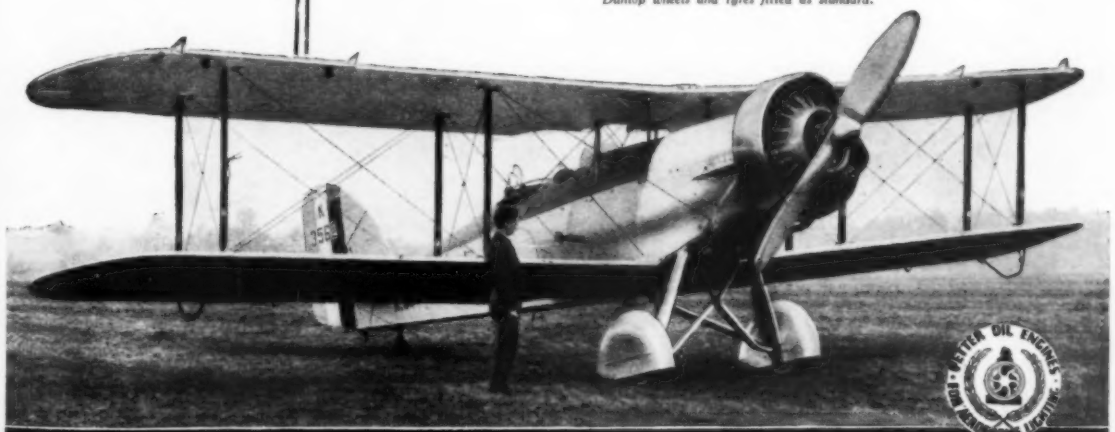

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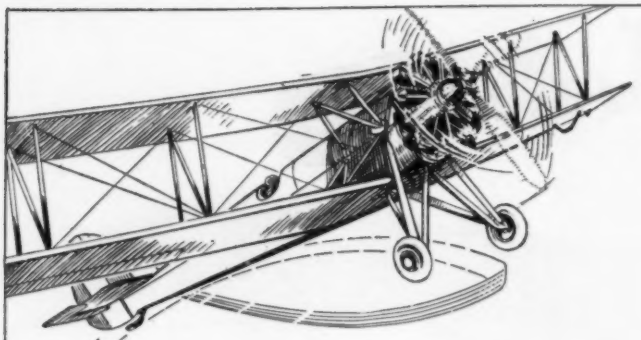

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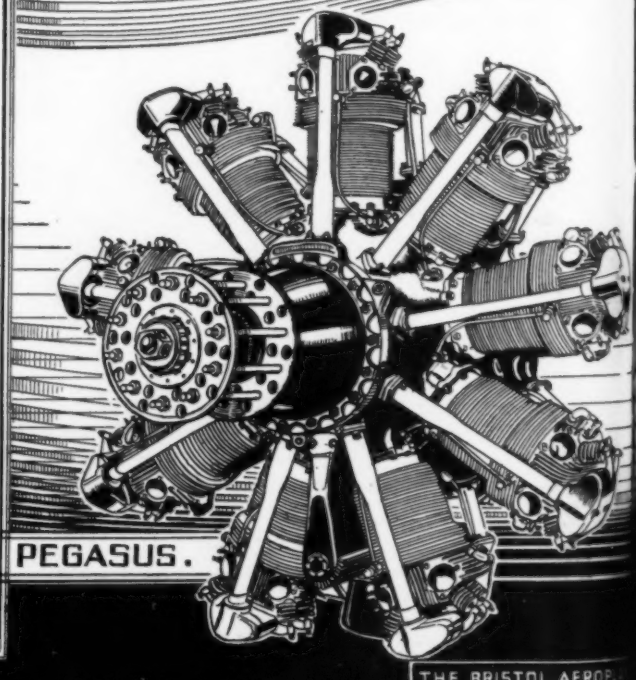

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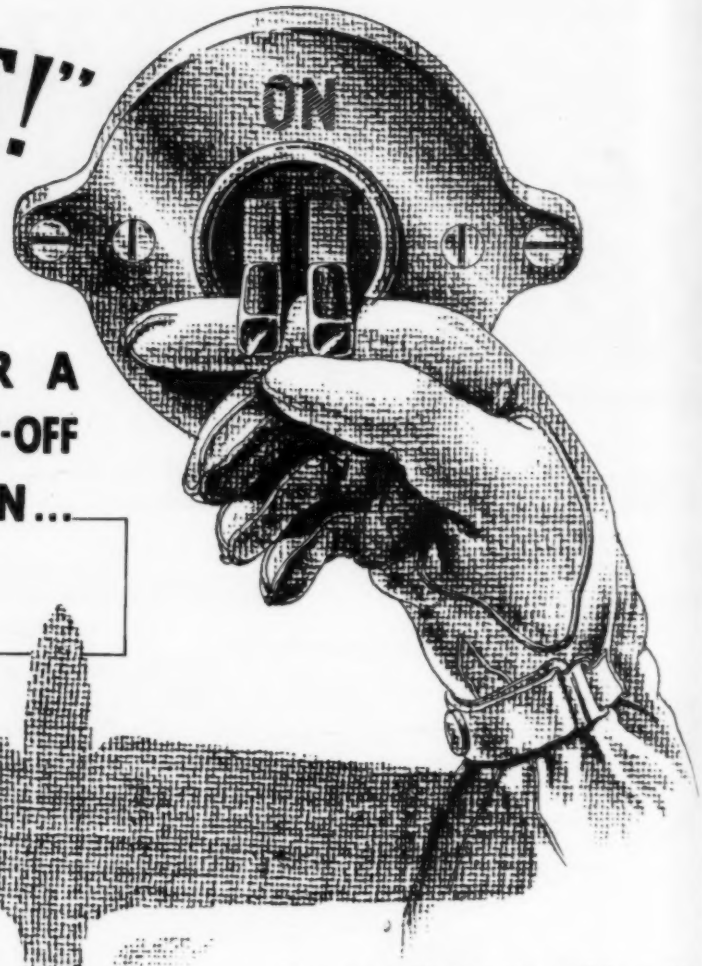

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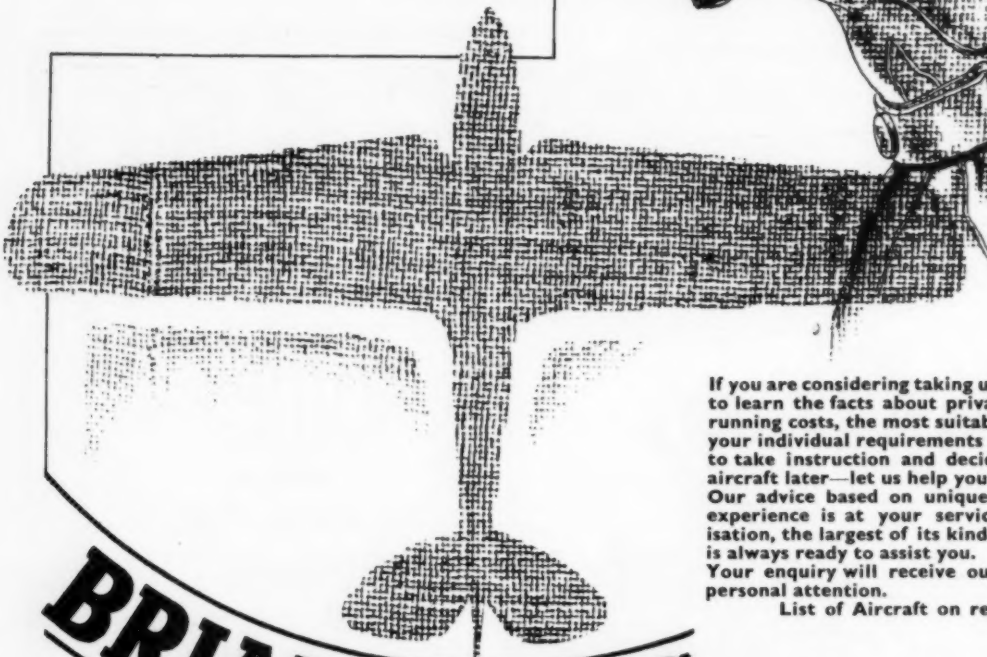

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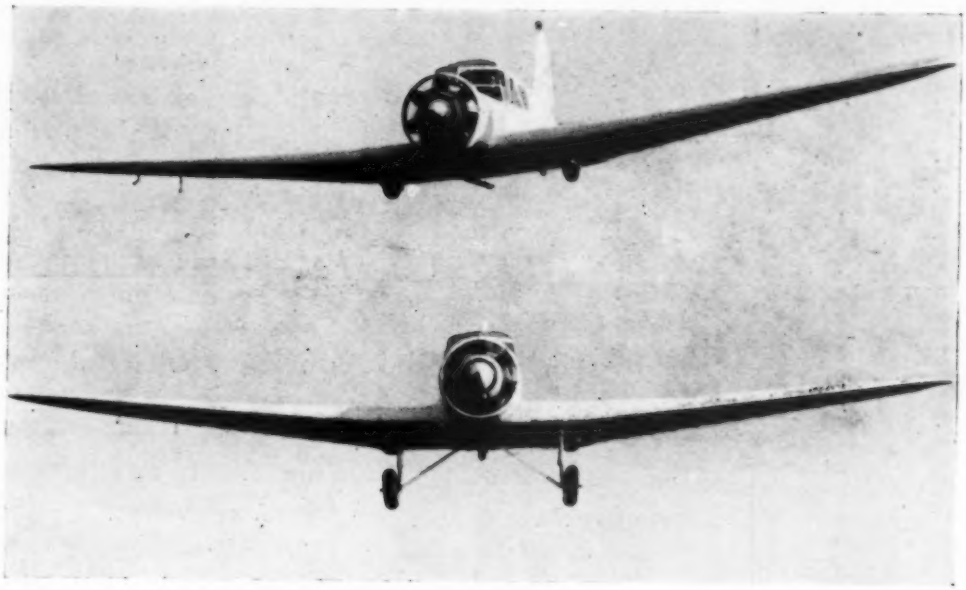

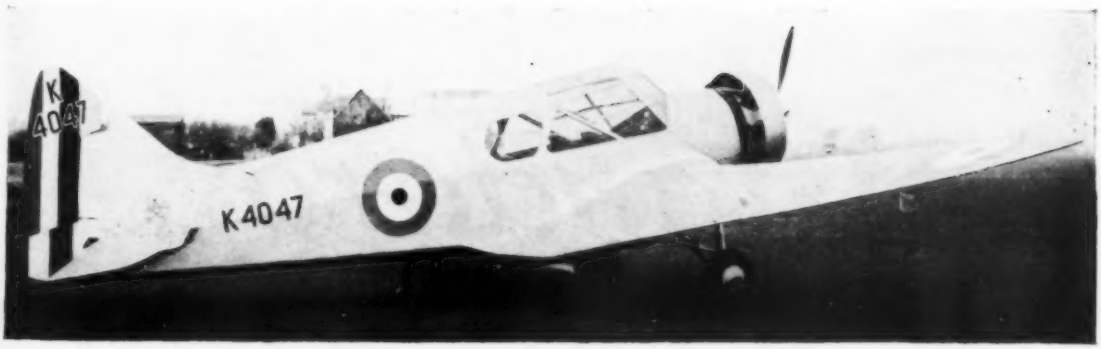

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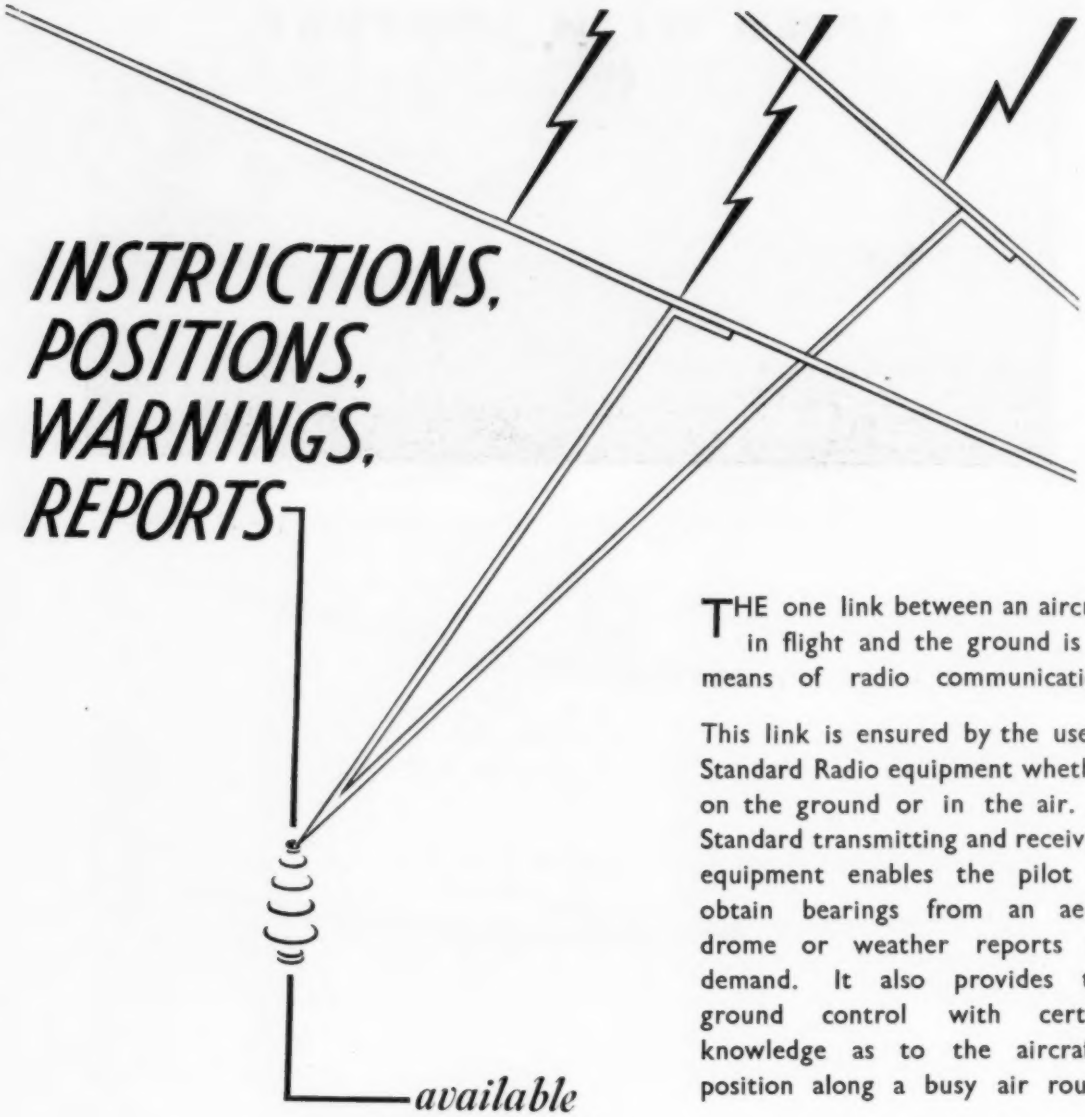

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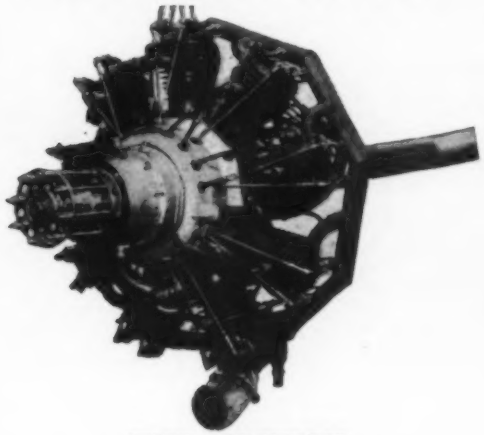

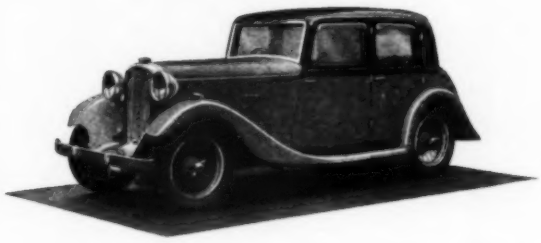

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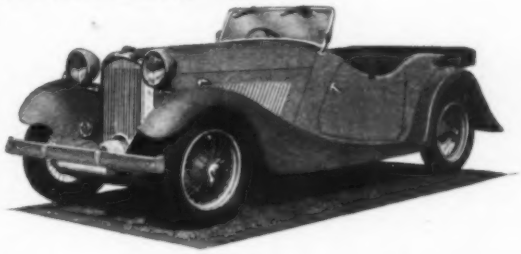

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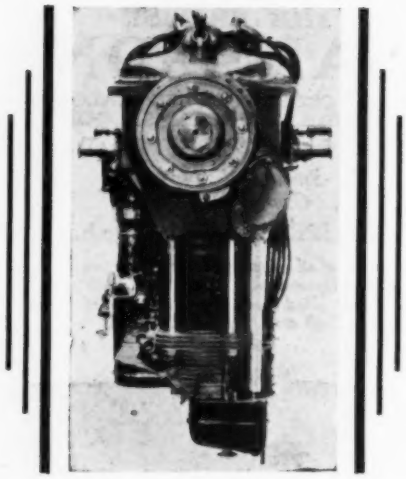

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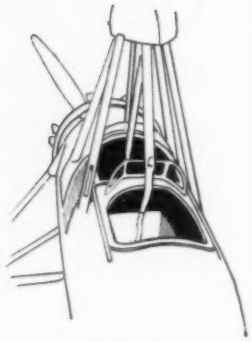

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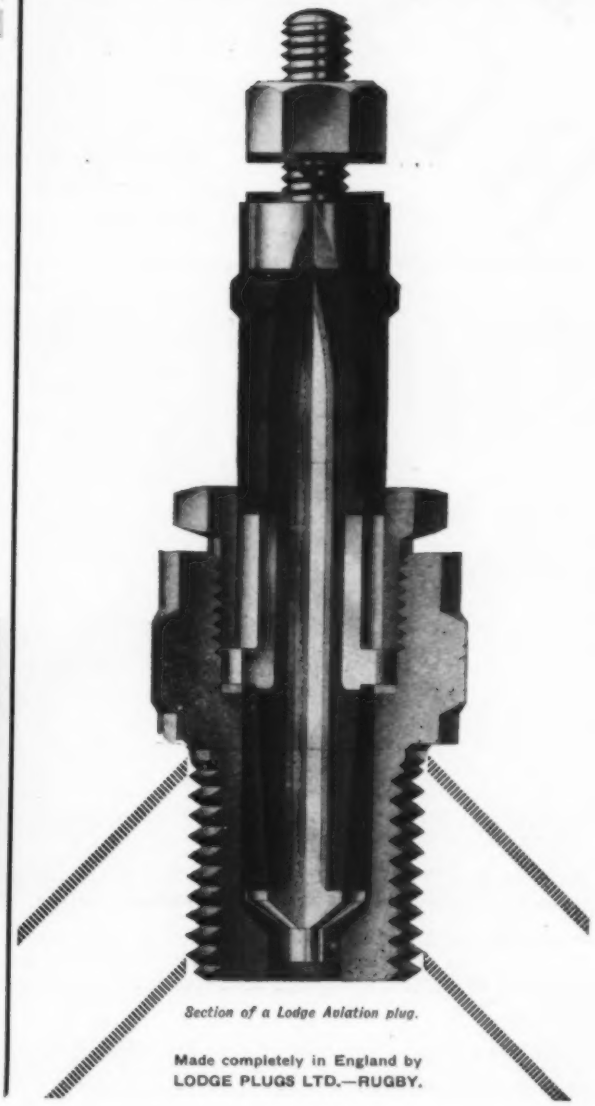

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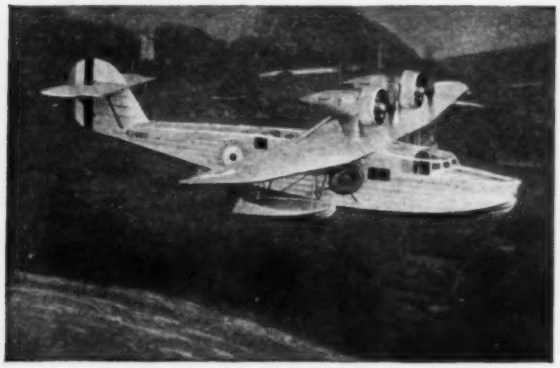

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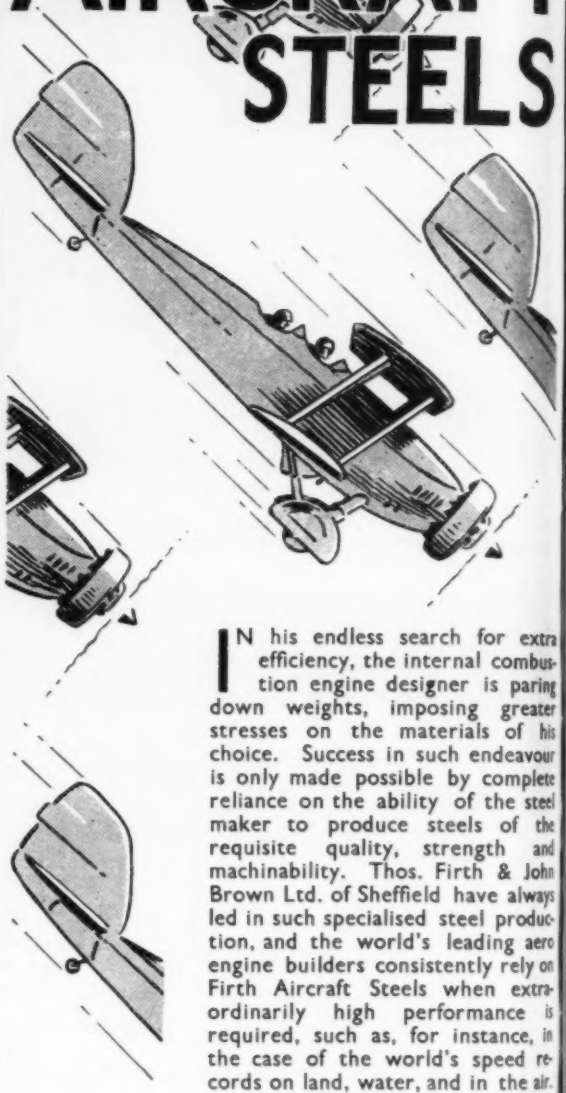

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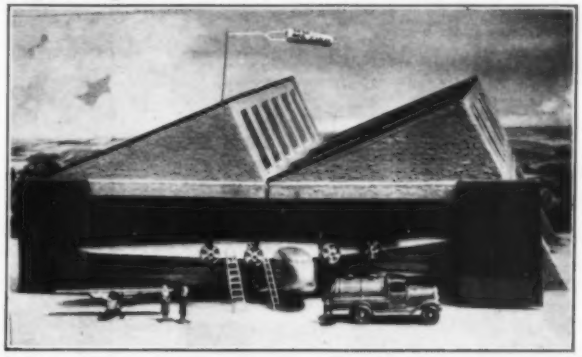

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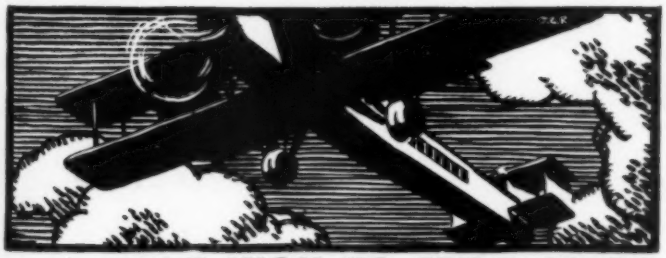

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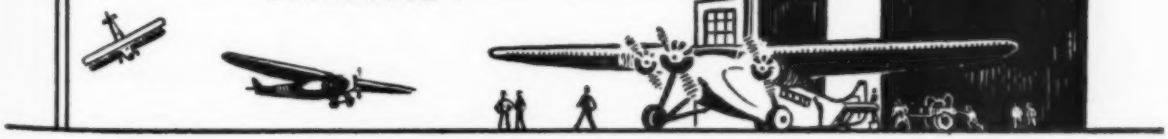

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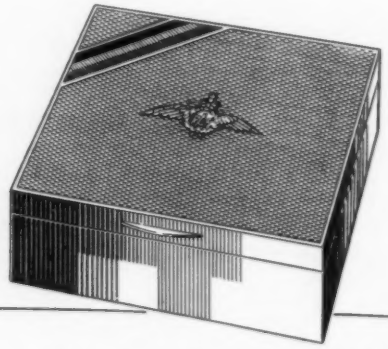

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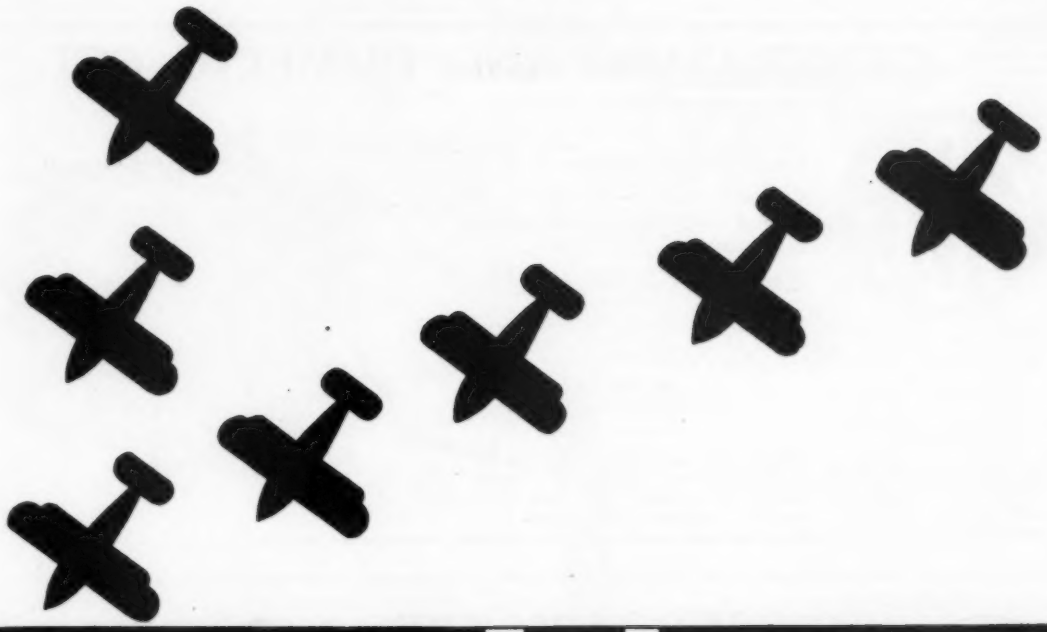

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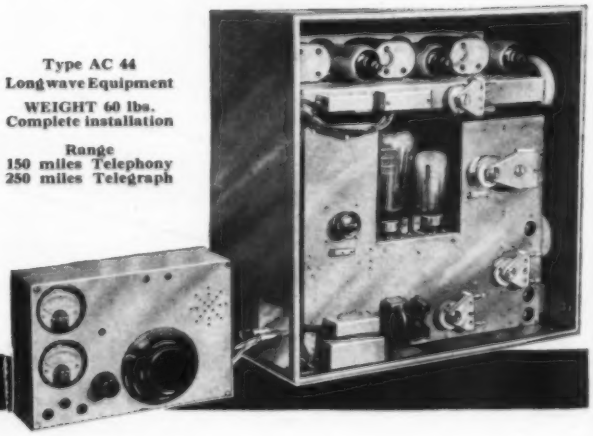

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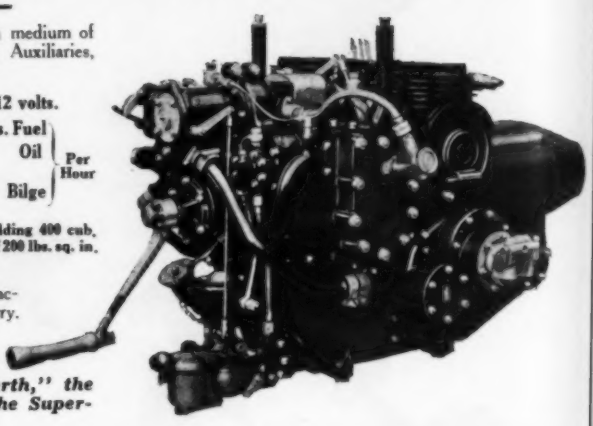

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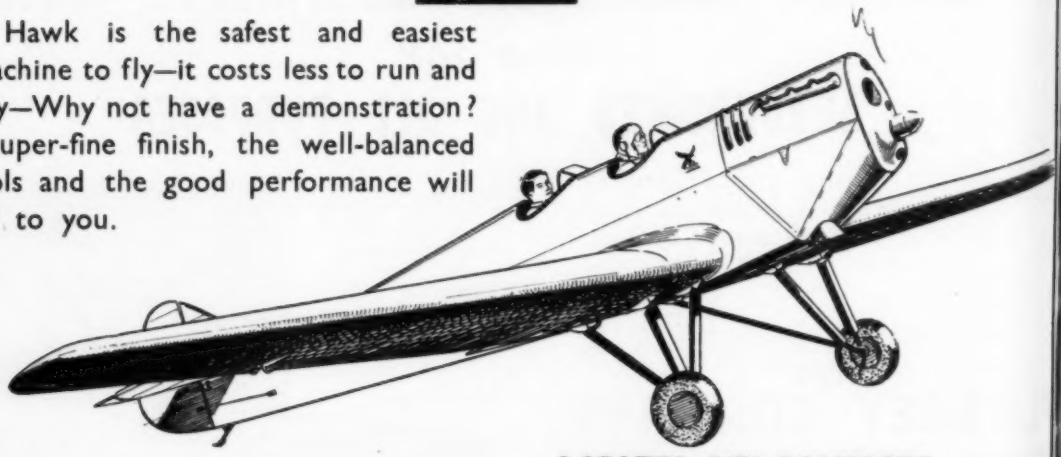

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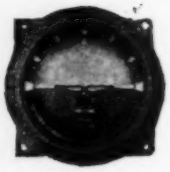

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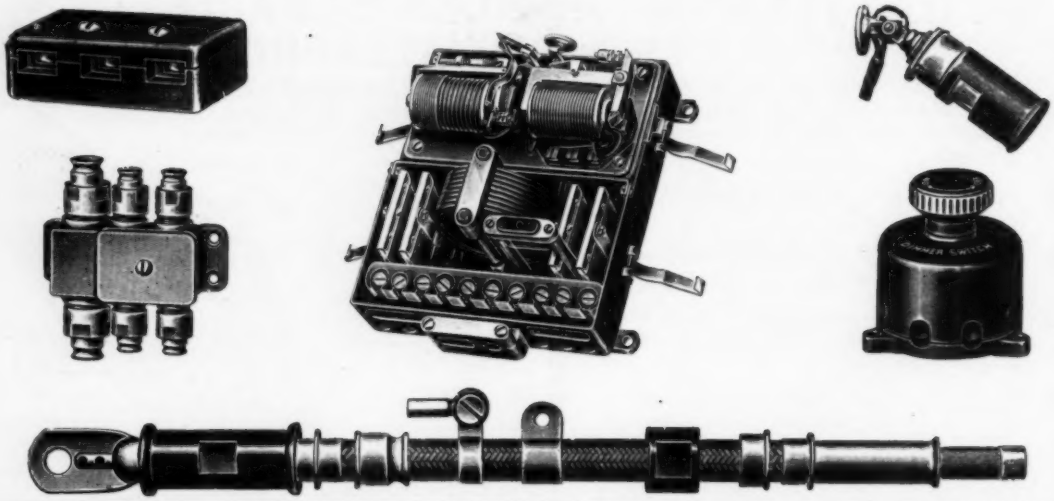

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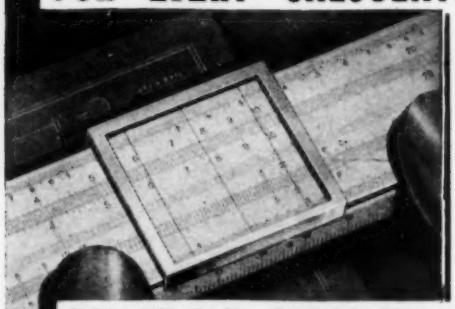

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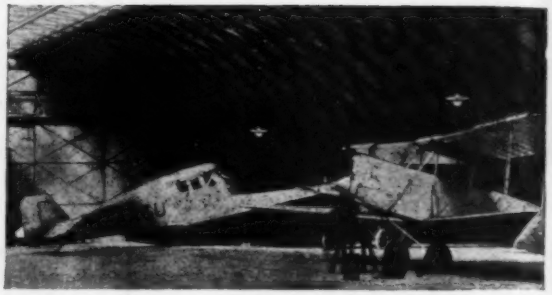

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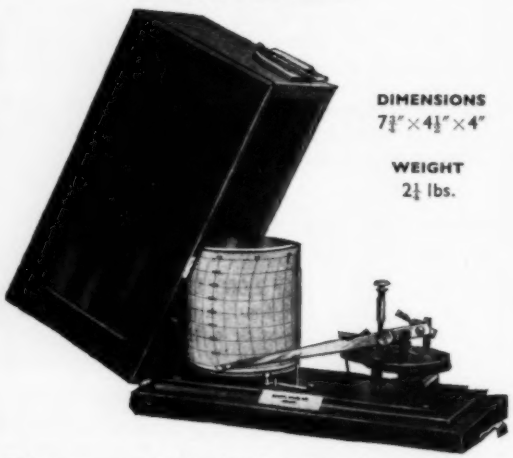

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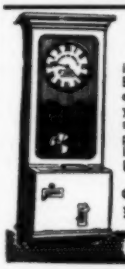

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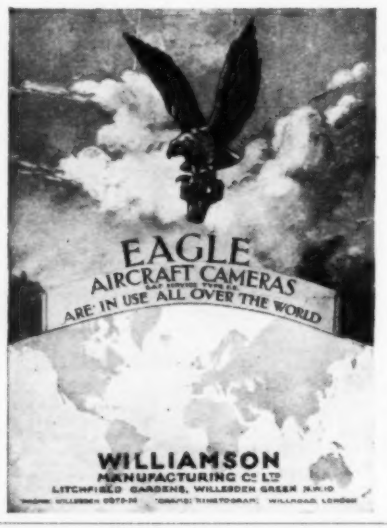

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